

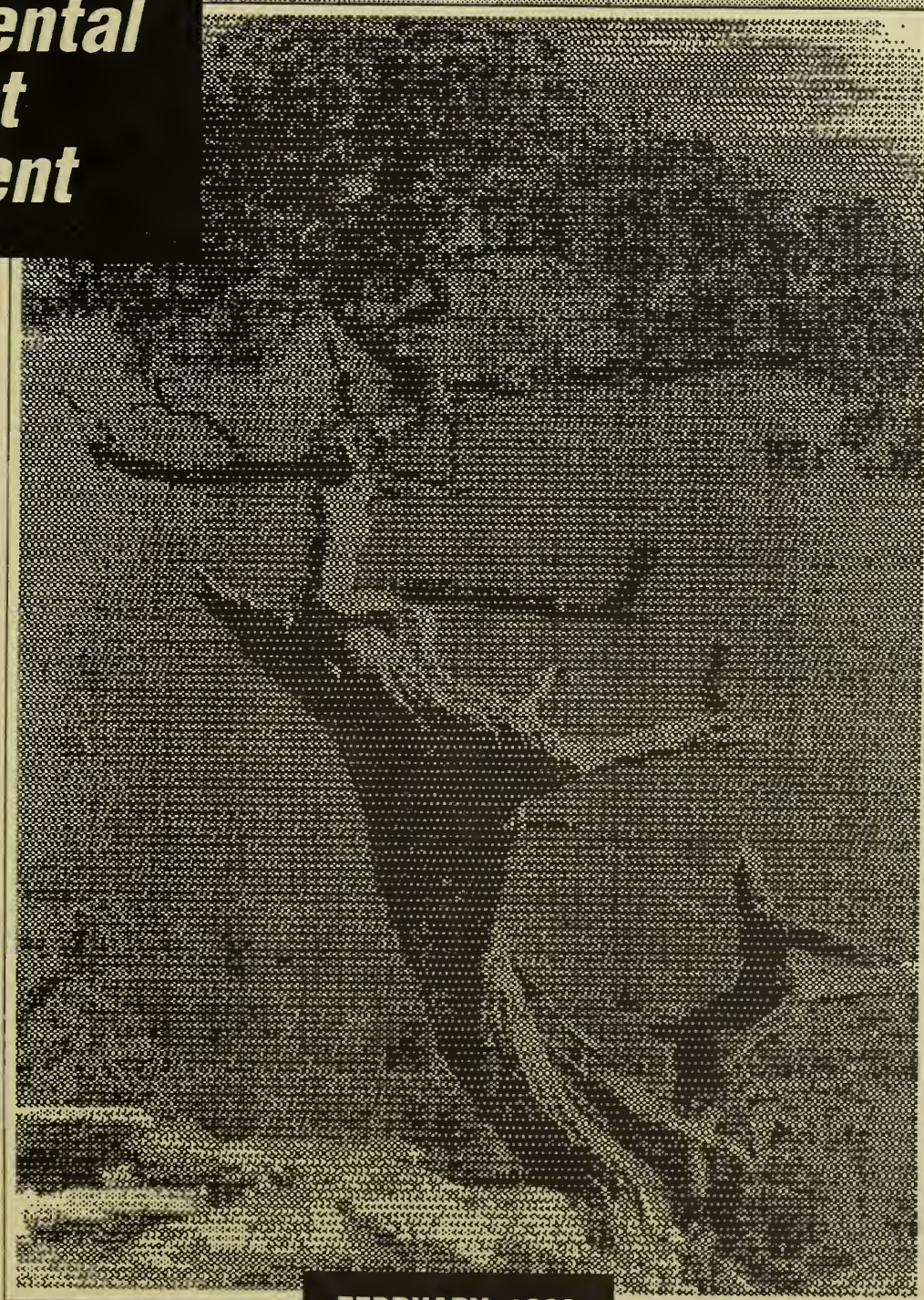
Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

aTD194
.56
.A82M68
1993

MOUNT MAGAZINE STATE PARK

FINAL Environmental Impact Statement



FEBRUARY, 1993

United States
Department of
Agriculture



National Agricultural Library

United States
Department of
Agriculture

Forest Service
Ozark-St. Francis
National Forests

P.O. Box 1008
Russellville, AR 72811
501-968-2354

Reply to: 1950-3/1600

Date: March 2, 1993

Dear Reader:

Enclosed is the Final Environmental Impact Statement (EIS) and the Record of Decision permitting a state park to be developed on the top of Mt. Magazine by the Arkansas Department of Parks and Tourism.

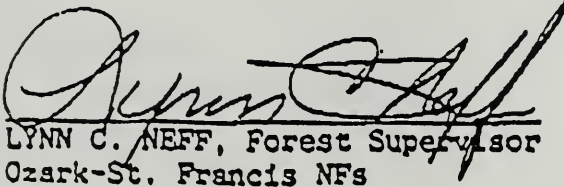
Alternative D was chosen because it is well balanced, considering the long term needs of the public, while protecting the environmentally sensitive mountain top. Alternative D includes facilities that are necessary for the Department of Parks and Tourism to provide economical year-round operation and maintenance of a state park. The planned construction affects less than one percent of the mountain's total environment. Included are a lodge, cabins, restaurant, pool and conference center with associated water and sanitation facilities in the vicinity of the former lodge and cabin site; as well as improvement of existing camping and picnic facilities. Additional hiking trails, administrative and visitor information facilities and a reconstructed homestead are also part of the plans.

If you commented during the public scoping period or during the Draft EIS period, you should feel some ownership in this project. Scoping comments were used to identify the issues and formulate the alternatives which were explored in the EIS. Comments received during the Draft stage were used to refine some analyses and strengthen mitigation measures. The response to comments are found in Appendix G of the EIS.

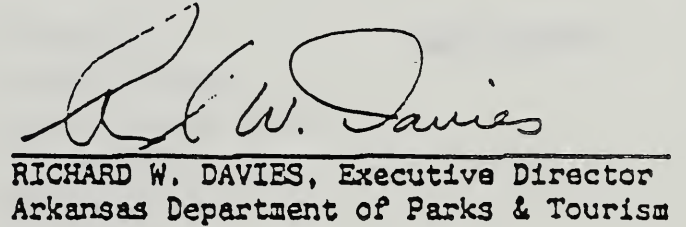
The Mt. Magazine project is unique in many ways. From the beginning, an Environmental Review Committee was formed to provide information and review during the process. Members of this committee included Arkansas Natural Heritage Commission, Arkansas Nature Conservancy, Arkansas Game and Fish Commission, U. S. Fish and Wildlife Service, Arkansas Historic Preservation Program, Mt. Magazine Association, Arkansas Conservation Coalition, Arkansas River Valley Area Council and Arkansas Wildlife Federation. Much of the EIS is a result of their hard work and input. The project is also a unique partnership between the Arkansas Department of Parks and Tourism and the Forest Service. This partnership will continue in the future as the two agencies cooperate in the areas of education, interpretation, habitat improvements, law enforcement and wildfire suppression.

If you are interested in an overview of the document, read the executive summary beginning on page 1. A table of contents immediately follows the executive summary. You may also be interested in the specifics about alternative D found on page 2-15, or the mitigation found on page 4-53. For further information, feel free to contact the individuals listed inside the cover of the EIS.

Sincerely,



LYNN C. NEFF, Forest Supervisor
Ozark-St. Francis NFs



RICHARD W. DAVIES, Executive Director
Arkansas Department of Parks & Tourism

**FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR
MOUNT MAGAZINE STATE PARK**

USDA Forest Service
Ozark National Forest
Arkansas

Responsible Official
Lynn C. Neff
Forest Supervisor

U.S. DEPARTMENT OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY

For Further Information Contact:

MAY 7 1993

Lead Agency:
USDA Forest Service
Ozark-St. Francis National Forests
P. O. Box 1008
Russellville, AR 72801

Rob Kopack
Recreation Officer
Magazine Ranger District
P. O. Box 511
Paris, AR 72855
501-963-3076

CATALOGING PREP.

Cooperating Agency:
Arkansas Dept. of Parks & Tourism
One Capitol Mall
Little Rock, AR 72201

Randy Roberson
Resource Management Specialist
Arkansas State Parks Division
One Capitol Mall
Little Rock, AR 72201
501-682-6938

Abstract

This environmental impact statement presents five alternatives for development of a state park facility on Mt. Magazine. These alternatives range from no new action, to development facilities which meet the highest projected level public use while still remaining economically viable. Effects of each alternative on the physical and biological environment and on social and economic conditions are presented. Alternative D is the Forest Service's and Arkansas Department of Parks and Tourism's preferred alternative.

EXECUTIVE SUMMARY

I. Purpose and Need

The purpose and need for this project is to provide a level of developed recreation in cooperation with Arkansas Department of Parks and Tourism on top of Mt. Magazine to meet local desires for lodge-type and associated recreation facilities while protecting the mountain environment as directed by the Forest Plan and Record of Decision.

This Environmental Impact Statement (EIS) describes options for the redevelopment of Mt. Magazine. The U.S. Forest Service has managed Mt. Magazine since 1934, and in 1989 granted a special use permit to the Arkansas Department of Parks and Tourism for the development and operation of a state park on approximately 2,200 acres of U.S. Forest Service lands on Mt. Magazine. Both agencies recognize the need to preserve, protect, and enhance the ecological and cultural resources of Mt. Magazine, while promoting recreational use of the Mountain. This document, therefore, describes the environment to be affected and the significant environmental effects of several development scenarios, including the No Action, No Change Alternative. The information provided in this EIS will be used by the U.S. Forest Service in cooperation with the Arkansas Department of Parks and Tourism to select the alternative(s) that will best meet these objectives.

Considerable controversy has evolved over the redevelopment of Mt. Magazine; therefore, public listening sessions were held prior to the development of this document to determine what the public prefers in the form of goods, services, uses, and environmental conditions on the Mountain. Public concerns were consolidated into six major issues: economics; opportunities for public use; environmental protection; impacts on proposed, endangered, threatened, or sensitive (PETS) species; location of developments; and preservation of cultural heritage.

This EIS was prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 as Amended, the Council on Environmental Quality (CEQ) regulations for preparation of an EIS, and regulations promulgated under the National Forest Management Act (1976).

II. Alternatives

A. Summary of Process Used to Formulate Alternatives

Five alternatives representing different development strategies on Mt. Magazine were formulated over a nine-month period and are based on the following:

- Arkansas Department of Parks and Tourism 1988 Prospectus for Mt. Magazine State Park.
- Management concerns and requirements set forth in the Special Use Permit.
- Comments, issues and concerns from public listening sessions held in December 1989 and June and July 1990.
- Environmental Review Committee (ERC) comments on draft alternatives.
- Input from other agencies regarding the presence and location of PETS species.
- Presence and location of important cultural resources.

- Previous engineering feasibility studies.
- The location of the Special Interest Area and the proposed Research Natural Area (RNA) on the slopes of Mt. Magazine.

The process involved development of alternatives that not only addressed management concerns and proposals, but were also responsive to issues and concerns raised by the public and various state and federal agencies. Draft alternatives were modified to reflect this input on the level of development, types of facilities, and recreational uses for the Mountain.

Based on the results of field studies for this EIS, the locations of developments were either moved, to avoid any potential negative effects on the Mountain's resources, or eliminated from further consideration or detailed study. Those actions, locations, and uses, and the rationale for their removal, are presented in Chapter 2.0.

B. Presentation and Comparison of Alternatives

Five alternatives were considered for detailed study in this EIS. A comparison of the alternatives is briefly described in the following paragraphs.

Alternative A is the No Action, No Change Alternative. Under this alternative, the U.S. Forest Service would continue operation according to the Land and Resources Management Plan for the Ozark-St. Francis National Forests (1989g). The slopes of the Mountain, currently designated as a Special Interest Area, will continue to be studied by the U.S. Forest Service for RNA status. Visitor use is lowest under this alternative; however, visitor control and regulation is limited. Visitation of the Mountain is expected to increase with the recent designation of Highway 309 as a U.S. Forest Service Scenic Byway. The least amount of resource commitments are expended under this alternative. Limited visitor control and regulation will continue to result in habitat degradation, plant species trampling, unauthorized collection of plant species, vandalism of historic structures, improper waste disposal in high-use areas, and recreational activities outside of designated areas. Species and habitat losses may occur through natural succession and species and habitat management prioritization. The continued existence of most PETS species will be promoted because of low visitation and use. Daytime recreational uses and overnight primitive camping opportunities will continue. The educational and research potential of the area is least developed under the No Action, No Change Alternative. Current trends in income, earnings, and labor force will continue. Daily management will continue to be the responsibility of the U.S. Forest Service. Annual operation and maintenance costs are the lowest under the No Action, No Change Alternative and are provided by the U.S. Forest Service.

Alternative B provides a low level of development, and was developed in response to public input that favored the reconstruction of mountaintop facilities that had historically been present on the Mountain. The daily management of Mt. Magazine's facilities would become the responsibility of the Arkansas Department of Parks and Tourism. The amount of vegetation removal, grading, soil compaction, acres affected by a change in use, and visitation is the second to the lowest under this alternative. Species and habitat losses, and plant species trampling from visitation, will increase over Alternative A but will be minimized by vegetation management implemented. Unauthorized collection of plant species, vandalism of structures, improper waste disposal, and recreational activities outside of designated areas will be eliminated by the presence

of full-time, on-site state park personnel. Continued existence of most PETS species will be favored as a result of restricted use areas. There is the potential for effects on those PETS species located near the old lodge site on the south side of the Mountain. Species and habitat protection at this location will be needed to mitigate effects on PETS species. The educational and research potential of the Mountain is increased over Alternative A, but is the second to the lowest of the five alternatives. Surface runoff and soil loss (i.e., erosion) are increased over Alternative A. No discernable differences in surface runoff exist between Alternatives B, C, and D. Total soil loss (i.e., tons per year) after development of this alternative is completed is the lowest of the development alternatives. Average soil loss per acre per year after development is completed is highest under this alternative. The effects of these increases, however, are negligible. The amount of wastewater discharged is the lowest of the four development alternatives. First costs for construction of new facilities and structures is the lowest of the four development alternatives, and annual operation and maintenance costs are the second to the lowest. Estimated yearly revenues and annual profits are the third to the highest of all alternatives. The availability of Mt. Magazine to a more diverse population is increased with new lodging facilities, and public safety is increased, while recreational opportunities, with the exception of hunter access to the slopes at Mt. Magazine, remain the same. An increase in the disturbance of the number of sites eligible for the National Historic Register will occur, but is the second to the lowest of all five alternatives. An increase in income, earnings and labor force and a decrease in unemployment will occur under this alternative and are the second to the lowest of all five alternatives.

Alternative C was formulated in response to public desires for the development of Mt. Magazine for expanded scientific research and educational use. Use of the Mountain by the public, and by scientific research, educational, and conservation organizations would be promoted under this alternative and regulated through a registration/reservation system at the proposed state park entrance. Facilities such as multi-purpose laboratory, library, and group facilities would be provided in support of these activities. No discernable difference exists between Alternatives C and B with respect to the total area affected by construction (i.e., amount of vegetation removed during construction, grading, soil compaction), acres affected by a change in use, surface runoff, vegetation management, unauthorized collection of plant species, vandalism of structures, improper waste disposal and projected first cost for construction. Total soil loss (i.e., tons per year) after development of this alternative is completed is the second highest of the four development alternatives; however, average soil loss per acre per year is similar to Alternative B. Continued existence of most PETS species will be favored as a result of restricted use areas. Recreational use outside of designated areas and direct and indirect effects on species and habitats, particularly PETS species, is expected to be the lowest under this alternative. The proposed development of the conference center complex with lodging facilities on the south side of the Mountain has the potential to affect PETS species at this location. Species and habitat protection measures will be needed under this and the other alternatives to mitigate effects on PETS species. Realization of the educational and research potential of the Mountain is the highest of all five alternatives under Alternative C. Recreational opportunities will remain the same as Alternative B. Annual operation and maintenance costs are the third lowest of the five alternatives. Estimated yearly revenues and annual profits are the second to the lowest of the five alternatives. Visitation to the Mountain under Alternative C is expected

to be the third highest of the alternatives (i.e., higher than Alternatives A and B), and the types of overnight facilities provided under this alternative will increase the opportunities for use of the Mountain by a more diverse population, particularly groups. The number of sites eligible for the National Historic Register that will be disturbed under this alternative is similar to Alternative B, and is the second highest of all the alternatives. An increase in earnings and labor force and a decrease in unemployment over Alternative B will occur. No discernable change in income will occur over Alternative B. Earnings, employment opportunities, and income are the third lowest of all of the alternatives.

Alternative D provides the size facilities and operations necessary for economical, year round operation and maintenance of a state park. Recreational opportunities are expanded in conjunction with the available overnight facilities. Visitation of the Mountain is second to the highest under this alternative. The area affected during facility construction is second highest of the alternatives; however, no discernable differences exist between Alternatives B, C, and D for the area affected by change in use. Species and habitat losses and plant species trampling is expected to be the second to the highest of the five alternatives, but can be offset by increased visitor control and vegetation management techniques. The continued existence of most PETS species will continue to be favored because of the restricted use areas. There is the potential for effects on those PETS species located near the old lodge site on the south side of the Mountain. Species and habitat protection measures necessary for maintaining the continued existence of the PETS species at this location will be needed, and the level of effort and expenditures for PETS species protection will be second to the highest of the five alternatives. Unauthorized collection of species, vandalism of structures, improper waste disposal, and recreation activities outside of designated areas will be eliminated by the presence of full-time, on-site state park personnel under this and the other development alternatives. The educational and research opportunities of this alternative and of Alternative E will be second highest. Recreational opportunities will be increased over Alternatives A, B, and C and are the second highest of the five alternatives. The amount of wastewater generated and discharged off the Mountain is the second highest of the four development alternatives. Total soil loss per year is the lowest under Alternative D and average soil loss per acre, per year is the second lowest of the five alternatives. While the expected changes in average soil loss development is the second to the lowest of the alternatives, there are no discernable differences in average soil loss and in surface runoff between Alternatives B, C, and D. The cumulative effects of these increases, however, are negligible. Projected first cost of construction, annual operation and maintenance costs, and estimated annual revenues and profits are the second highest of all the alternatives. A large increase in earnings, income and labor force and a decrease in unemployment is experienced in the primary impact area when compared to Alternatives A, B, and C. This alternative results in the second highest levels for earnings, labor force, and income of all alternatives. The number of significant archeological sites affected by this alternative is the highest and the same as Alternative E. This alternative is the preferred alternative.

Alternative E provides a level of development for recreational, educational and scientific use in which the facilities and operations can support the maximum capacity of occupants, while remaining economically feasible for sustained, year round operation and maintenance. Management of Mt. Magazine's resources will be a cooperative effort by the Arkansas Department of Parks and Tourism and the U.S. Forest Service. The total area affected by

construction and by a change in use is the highest of all five alternatives. Direct and indirect effects on vegetation will be greatest under this alternative and will require the greatest amount of resources to mitigate effects of construction and operation on the vegetation, particularly at the old lodge site where plant communities that are limited in distribution are located. Some effects on these communities and on PETS species found at this location will be unavoidable. The increase in surface runoff and wastewater discharged is the highest, the change in total soil loss due to development is the highest, while the increase in average soil loss per acre per year is the lowest of the alternatives. The cumulative effects of increased erosion, surface runoff, and wastewater discharged into drainages off the Mountain is negligible and below thresholds considered to have significant effects on natural change. Projected first costs, annual operation and maintenance costs, annual revenues and profits, and positive socioeconomic effects on income, earnings, and the labor force of the primary impact area are the greatest. Recreational opportunities and visitation are the greatest under this alternative. The number of archeological sites affected under this alternative is equal to those affected under Alternative D, and is the highest under these two alternatives. No increased effects on other natural and cultural resources will occur under Alternative E.

III. Affected Environment

Mt. Magazine is located in southeast Logan County, Arkansas, approximately 100 miles northwest of the City of Little Rock. Mt. Magazine, the highest point in Arkansas, rises out of the Arkansas River Valley to an elevation of 2,753 ft above mean sea level. The Mountain is generally a flat-topped plateau rimmed by precipitous rock bluffs. Mt. Magazine's climate, altitude, relief, and rock characteristics combine to form rock streams on the Mountain's steep slopes; rock streams are a unique geologic feature found in few places in the State and provide habitat for the threatened Magazine Mountain shagreen snail.

Three soil series occur on the Mountain, with characteristics ranging from shallow sandy loam on the mountaintop to clayey and stony soils on the side slopes with severe erosion hazard.

Surface and ground water resources are limited and depend on the amount of precipitation that falls directly on the Mountain. The Mountain's springs provide habitat for sensitive plant species, and numerous vertebrate and invertebrate organisms; water quality of these springs is generally excellent.

Tucker (1990a) described the vegetation on Mt. Magazine as including eleven plant communities, all of which occur in the affected environment. Included are the mesic oak-hickory, xeric oak-hickory, mesic bluffline, scrub oak woodland, juniper-hardwood woodlands, xeric sandstone glade, pine community, shortleaf pine-hardwood, and the sphagnum seep communities. Two communities described by Tucker (1990a) as (1) a successional weedy community and (2) remnants of former cultivation are treated here as a single community, the disturbed plant community. Seventeen plant species proposed for federal listing or considered sensitive by multiple agencies have been identified on Mt. Magazine, including the maple-leaf oak (*Quercus shumardii* var. *acerifolia*), Ozark chinquapin (*Castanea pumila* var. *ozarkensis*) and the Ouachita leadplant (*Amorpha ouachitensis*).

The Mountain is home to many wildlife species. One vertebrate species, the rufous-crowned sparrow (*Aimophila ruficeps*), occurs on Mt. Magazine and is of special concern as a State rare and endangered species. No federally listed threatened or endangered vertebrate

species are known from the top of the Mountain. Of the invertebrate species on the Mountain, nine species are being studied for possible federal listing as threatened or endangered. One species, American burying beetle (*Nicrophorus americanus*) is federally listed as endangered and while having the potential to occur, this species has not been recorded on the mountaintop. Another species Magazine Mountain shagreen (*Mesodon magazinensis*), is federally listed as threatened. One isopod species (*Lirceus bicuspidatus*) is considered rare or uncommon in the State.

Little is known about the prehistoric or Indian cultures that occupied or utilized Mt. Magazine. Artifacts and sites dating as early as 7,000 B.C. have been found in various environmental settings on the top and sides of the Mountain. This lack of information on the prehistoric periods contrasts with the rich cultural history spanning from the Pioneer Settlement period in 1850 through the Great Depression of the 1930's. Numerous archeological deposits and above-ground features dating to the historic occupation on the Mountain remain. Included among these are the rockwork, ruins, and standing structures built during the government work programs (e.g., Civilian Conservation Corps and Works Progress Administration). Both prehistoric sites and historic properties have been found within the proposed project boundaries. Based on information to date, many of these sites and properties may be eligible for nomination to the National Register of Historic Places.

The grand views from Mt. Magazine are one of the main reasons both in-state and out-of-state visitors currently come to the Mountain. Other use opportunities include rock climbing, hang gliding, hiking, horseback riding, bird watching, camping, car touring and non-directed educational study. Unfortunately, limited control and regulation of the mountaintop have resulted in vandalism and unsightly disposal of trash.

Population in the Mt. Magazine area is predominantly rural. Population growth in this area has slowed dramatically since 1980 compared to the national average, and the population profile does not look promising over the next two decades. Total and per capita personal income levels are lower than the state average and no change in this relationship is expected at present. The majority of the population is employed in agriculture. Average weekly earnings in manufacturing employment, construction, transportation and public utilities, and finance, insurance, and real estate are less than the state average. Labor force participation rate is lower than expected because of low employment opportunities. The overall economic health of the study area is reflected in the long distances workers commute, often leaving the county of residence, to obtain employment.

Existing recreational facilities include access by means of Highway 309, both improved and unimproved Forest Development Roads, a campground, well marked trails, four picnic areas, eight scenic overlooks, power lines and communication lines.

IV. Environmental Consequences

Implementation of any of the alternatives would affect the physical, biological, cultural, social and economic resources of Mt. Magazine. The direct and indirect effects, the relationship between short-term use and long-term productivity, irreversible and irretrievable commitment of resources, and environmental effects that cannot be avoided are summarized below.

Alternative A, the No Action Alternative, has no construction-related impacts and results in a minimal amount of irreversible and irretrievable commitment of land, water and air

resources. Alternative A would result in continued socioeconomic trends. These trends include low or no growth population projections for the primary impact area, a decrease in income, earnings, and labor force, and an increase in unemployment. There is also concern over the potential effects on the environment as a result of limited visitor control and regulation on the Mountain under this alternative. These effects include:

- Habitat degradation and trampling and loss of sensitive plant species found in the limited sphagnum seep communities and the bluffline communities on the north, west, and south sides of the Mountain. These communities receive a consistent amount of visitation even though they are outside of designated recreational or day use areas.
- The loss of sensitive plant species and unique or rich communities from natural successional and unregulated collection.
- The potential for habitat destruction by camping and escaped campfires outside of designated camping areas and lack of readily available fire protection.
- Vandalism and unauthorized collection of archeological and historical resources as a result of limited visitor control and regulation.
- The continued impairment of visual quality of the Mountain as a result of vandalism and improper trash disposal.
- Unrestricted access to steep bluffs would continue to be a safety hazard for visitors and rock climbers.

The direct effects of development Alternatives B through E are as follows:

- Erosion can be expected during construction of the water line; however, the cumulative effects of erosion will be of little or no consequence because land disturbances will be kept to a minimum and restabilization scheduled as soon as practicable. Consequently, these effects are expected to be minimal and short-term.
- Construction activities would result in the direct removal of 13.6 (Alternative B) to 20.9 (Alternative E) acres of vegetative cover and soil through clearing, grading and compaction; the removal of vegetative cover would temporarily displace some wildlife species. Under Alternative E, less than 1 percent of the vegetative cover of the mountaintop would be removed for construction because some construction will take place in already-cleared areas.
- A small percentage of PETS plant species may be removed during proposed construction at the old lodge site; these PETS species include the Ouachita leadplant, Bush's poppy mallow, and broom nailwort. Bush's poppy mallow, however, may already be extirpated from the Mountain.
- Construction at the old lodge site may result in the loss of nest sites for the rufous-crowned sparrow, a PETS species.

- These development alternatives may have an effect on unidentified cultural resources outside the surveyed area. To date, 6 (Alternative B) to 12 (Alternatives D and E) sites that are potentially eligible for nomination to the National Register of Historic Places have been identified in the vicinity of the proposed developments.

The indirect effects of Alternatives B through E include:

- Construction of the water line and storage facilities will provide a year-round supply of water, and a readily available mechanism for fire protection on the Mountain.
- Alternatives B, C, D and E provide for additional toilets and a conventional wastewater treatment facility, which would improve human waste disposal in recreation areas and provide for the protection of both human health and water quality.
- Approximately 7,800 gallons per day (Alternative B) to 23,800 gallons per day (Alternative E) of wastewater would be treated and discharged off the Mountain. The effluent will contain nutrients that will promote the growth of vegetation in proximity to the outfall of the discharge pipe under Alternatives B through E.
- The proposed rim trail traverses a few plant communities with limited distribution on the Mountain and the habitat of some sensitive species, but changes to these habitats and loss of species as a result of trail use are avoidable by rerouting the proposed trail away from these areas.
- Indirect effects (e.g., habitat destruction, species displacement, vandalism) to plant communities, wildlife, aesthetics, and cultural resources as a result of increased accessibility and by an increased number of visitors will be mitigated by visitor control, resource protection measures, and on-site monitoring and enforcement to protect these resources.
- Effects on the rufous-crowned sparrow, broom nailwort, and other PETS species will increase as visitation to the Mountain increases under Alternatives D and E. Some of these effects can be minimized and avoided.
- Inclusion of restricted use areas should be beneficial to all PETS species and the long-term maintenance of the unique ecological components and communities of the Mountain.
- Environmental education and research programs and environmental monitoring by multiple agencies will increase the continued existence of unique species and the Mountain's natural resources.
- As accessibility is increased by roads, trails, and development, archeological and historic sites may become vulnerable to nonscientific collecting and vandalism; however, these effects should be mitigated by the presence of full-time state park personnel and site monitoring.
- An increase in income, earnings, and labor force, and a decrease in unemployment, will occur under Alternatives B, C, D, and E, with the highest of these positive socioeconomic effects occurring under Alternative E.

- The area affected by a change in use ranges from 59.1 acres (Alternative B) to 71.5 acres (Alternative E), or approximately 2.5 - 3.0 percent of the total area on top of the Mountain.

The relationships between short-term use and long-term productivity include:

- The development of Mt. Magazine will provide for the long-term protection and/or conservation of the environmental resources of Mt. Magazine, especially PETS plant, vertebrate, and invertebrate species and species of concern through restricted access and regulated recreational use. Environmental resources would be monitored and maintained via environmental resource protection programs in all the development alternatives.
- Promotion of opportunities in education and scientific research will enhance environmental protection on Mt. Magazine.
- Anticipated long-term needs for water will be met under the development alternatives.
- The protection of public health and safety would be enhanced through proposed facilities and the presence of on-site state park personnel.
- Short-term expenditures during construction are expected to generate new jobs as well as increase gross sales and wages; long-term effects associated with tourist related expenditures are also expected to create new jobs and increase gross sales and wages.

Irreversible and irretrievable commitment of resources include:

- Projected first costs commitments for construction, and architectural and engineering design. These costs range from \$8,140,000 (Alternative B) to \$17,457,750 (Alternative E) and will be provided by the State of Arkansas.
- Commitments of annual resources such as water, energy, oil and gasoline.
- Irreversible loss of vegetative cover in construction areas.
- Some of the effects of natural succession may result in an irreversible loss of unique vertebrate species.

Environmental effects that cannot be avoided include:

- Construction activities under the development alternatives. These activities would result in unavoidable effects on ground cover and soil through clearing, grading and compaction.
- Changes in plant communities and plant, vertebrate, and invertebrate species composition in high use areas under Alternatives B, C, D, and E.

- Minor loss of bluffline plant species by trampling and displacement by weedy species in the high use areas on the south side of the Mountain at the old lodge site.
- Visual intrusion caused by the construction of the water line and associated access roads. This intrusion will lessen with time.

TABLE OF CONTENTS

1.0	PURPOSE AND NEED	1-1
1.1	Purpose and Need	1-1
1.2	Overview of Development on Mt. Magazine	1-1
1.3	History of Redevelopment Efforts	1-1
1.4	Proposed Action	1-3
1.5	Decision to be Made	1-3
1.6	Activities Addressed	1-4
1.7	Issues and Concerns	1-4
1.8	Compliance with Laws and Regulations	1-4
1.9	Contents of this EIS	1-8
2.0	ALTERNATIVES INCLUDING THE PROPOSED ACTION	2-1
2.1	Introduction	2-1
2.2	Alternatives Development	2-1
2.3	Alternatives Eliminated from Further Study	2-4
2.4	Presentation of Final Alternatives Studied	2-6
2.4.1	Alternative A	2-6
2.4.2	Alternative B	2-11
2.4.3	Alternative C	2-13
2.4.4	Alternative D (Preferred Alternative)	2-15
2.4.5	Alternative E	2-18
2.5	Comparison of Alternatives	2-20
2.5.1	Soil, Water and Air	2-20
2.5.2	Vegetation	2-27
2.5.3	Wildlife (Vertebrates)	2-28
2.5.4	Wildlife (Invertebrates)	2-29

TABLE OF CONTENTS (CONTINUED)

2.5.5	Proposed, Endangered, Threatened and Sensitive (PETS) Species	2-29
2.5.5.1	Plants	2-29
2.5.5.2	Wildlife (Vertebrates)	2-30
2.5.5.3	Wildlife (Invertebrates)	2-30
2.5.6	Cultural Resources	2-30
2.5.7	Socioeconomics	2-31
2.5.8	Opportunities for Public Use	2-31
2.5.9	Aesthetics	2-32
3.0	THE AFFECTED ENVIRONMENT	3-1
3.1	An Overview of the Affected Environment	3-1
3.2	Geology and Physiography	3-1
3.3	Soils	3-3
3.4	Climate	3-3
3.5	Surface Water and Groundwater	3-3
3.6	Vegetation	3-5
3.6.1	The Mesic Oak-Hickory Community	3-7
3.6.2	The Xeric Oak-Hickory Community	3-7
3.6.3	Mesic Bluffline Community	3-8
3.6.4	Juniper-Hardwood Woodland Community	3-8
3.6.5	Scrub Oak Woodland Community	3-8
3.6.6	Sphagnum Seep Community	3-8
3.6.7	Xeric Sandstone Glade Community	3-9
3.6.8	Shortleaf Pine-Hardwood Forest Community	3-9
3.6.9	Pine Community	3-9
3.6.10	Disturbed Communities	3-10

TABLE OF CONTENTS (CONTINUED)

3.7	Wetlands	3-10
3.8	Wildlife	3-10
3.8.1	Vertebrates	3-10
3.8.1.1	Elimination of Management Indicator Species from Further Study	3-13
3.8.2	Invertebrates	3-13
3.9	Proposed, Endangered, Threatened, and Sensitive (PETS) Species	3-14
3.9.1	Introduction	3-14
3.9.2	Plants	3-14
3.9.3	Wildlife (Vertebrates)	3-21
3.9.4	Wildlife (Invertebrates)	3-25
3.9.5	PETS Species Studied Further in EIS	3-29
3.10	Cultural Resources	3-30
3.10.1	Prehistory and History	3-30
3.10.2	Archeological Sites and Historic Properties	3-33
3.11	Socioeconomic Environment	3-33
3.11.1	Economic Area	3-33
3.11.2	Population	3-33
3.11.3	Income	3-41
3.11.4	Earnings	3-46
3.11.5	Labor Force	3-46
3.11.6	Unemployment and Commuting Patterns	3-48
3.12	Opportunities for Public Use	3-54
3.13	Aesthetics	3-54
4.0	ENVIRONMENTAL CONSEQUENCES	4-1
4.1	Introduction	4-1

TABLE OF CONTENTS (CONTINUED)

4.2	Alternative A (No Action, No Change)	4-2
4.2.1	Soil, Water, and Air	4-2
4.2.2	Vegetation	4-2
4.2.3	Wetlands	4-5
4.2.4	Wildlife (Vertebrates)	4-5
4.2.5	Wildlife (Invertebrates)	4-5
4.2.6	Proposed, Endangered, Threatened and Sensitive (PETS) Species	4-5
4.2.6.1	Plants	4-5
4.2.6.2	Wildlife (Vertebrates)	4-6
4.2.6.3	Wildlife (Invertebrates)	4-6
4.2.7	Cultural Resources	4-7
4.2.8	Socioeconomics	4-7
4.2.9	Opportunities for Public Use	4-7
4.2.10	Aesthetics	4-8
4.3	Alternative B	4-8
4.3.1	Soil, Water, and Air	4-8
4.3.1.1	Soil	4-8
4.3.1.2	Water	4-10
4.3.1.3	Air	4-11
4.3.2	Vegetation	4-12
4.3.2.1	Construction Effects	4-12
4.3.2.2	Effects of Operation and Maintenance	4-14
4.3.3	Wetlands	4-15

TABLE OF CONTENTS (CONTINUED)

4.3.4	Wildlife (Vertebrates)	4-16
4.3.4.1	Construction Effects	4-16
4.3.4.2	Effects of Operation and Maintenance . . .	4-16
4.3.5	Wildlife (Invertebrates)	4-17
4.3.6	Proposed, Endangered, Threatened, and Sensitive (PETS) Species	4-17
4.3.6.1	Plants	4-17
4.3.6.2	Wildlife (Vertebrates)	4-18
4.3.6.3	Wildlife (Invertebrates)	4-19
4.3.7	Cultural Resources	4-19
4.3.8	Socioeconomics	4-22
4.3.9	Opportunities for Public Use	4-22
4.3.10	Aesthetics	4-24
4.4	Alternative C	4-25
4.4.1	Soil, Water, and Air	4-25
4.4.2	Vegetation	4-26
4.4.2.1	Construction Effects	4-26
4.4.2.2	Effects of Operation and Maintenance . . .	4-26
4.4.3	Wetlands	4-26
4.4.4	Wildlife (Vertebrates)	4-26
4.4.5	Wildlife (Invertebrates)	4-27
4.4.6	Proposed, Endangered, Threatened, and Sensitive (PETS) Species	4-27
4.4.6.1	Plants	4-27
4.4.6.2	Wildlife (Vertebrates)	4-27
4.4.6.3	Wildlife (Invertebrates)	4-27
4.4.7	Cultural Resources	4-27
4.4.8	Socioeconomics	4-28

TABLE OF CONTENTS (CONTINUED)

4.4.9	Opportunities for Public Use	4-28
4.4.10	Aesthetics	4-28
4.5	Alternative D (Preferred Alternative)	4-30
4.5.1	Soil, Water, and Air	4-30
4.5.1.1	Soil	4-30
4.5.1.2	Water	4-31
4.5.1.3	Air	4-32
4.5.2	Vegetation	4-33
4.5.2.1	Construction Effects	4-33
4.5.2.2	Effects of Operation and Maintenance . . .	4-36
4.5.3	Wetlands	4-38
4.5.4	Wildlife (Vertebrates)	4-38
4.5.5	Wildlife (Invertebrates)	4-38
4.5.6	Proposed, Endangered, Threatened, and Sensitive (PETS) Species	4-38
4.5.6.1	Plants	4-38
4.5.6.2	Wildlife (Vertebrates)	4-40
4.5.6.3	Wildlife (Invertebrates)	4-40
4.5.7	Cultural Resources	4-41
4.5.8	Socioeconomics	4-42
4.5.9	Opportunities for Public Use	4-42
4.5.10	Aesthetics	4-45
4.6	Alternative E	4-45
4.6.1	Soil, Water, and Air	4-46
4.6.1.1	Soil	4-46
4.6.1.2	Water	4-46
4.6.1.3	Air	4-48
4.6.2	Vegetation	4-48

TABLE OF CONTENTS (CONTINUED)

4.6.3	Wetlands	4-48
4.6.4	Wildlife (Vertebrates)	4-49
4.6.5	Wildlife (Invertebrates)	4-49
4.6.6	Proposed, Endangered, Threatened, and Sensitive (PETS) Species	4-49
4.6.6.1	Plants	4-49
4.6.6.2	Wildlife (Vertebrates)	4-49
4.6.6.3	Wildlife (Invertebrates)	4-49
4.6.7	Cultural Resources	4-49
4.6.8	Socioeconomics	4-50
4.6.9	Opportunities for Public Use	4-50
4.6.10	Aesthetics	4-53
4.7	Mitigation Measures	4-53
5.0	LIST OF PREPARERS	5-1
6.0	LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THIS STATEMENT WILL BE SENT	6-1
7.0	CONTENT ANALYSIS	7-1
7.1	Written Comments	7-1
7.1.1	Location of Respondent Residences	7-1
7.1.2	Respondent Affiliations	7-1
7.1.3	Suggested Modifications	7-1
7.2	Oral Comments	7-4
7.2.1	Little Rock Meeting	7-4
7.2.2	Paris Meeting	7-4
8.0	REFERENCES	8-1
9.0	INDEX	9-1

APPENDICES

APPENDIX A:	Excerpts from "A Survey of the Botanical Features of Magazine Mountain on the Slopes and Plateau Surface," Gary E. Tucker, Jan. 1990
APPENDIX B:	Vegetation
APPENDIX C:	Vertebrates
APPENDIX D:	Invertebrates
APPENDIX E:	Socioeconomics
APPENDIX F:	Engineering
APPENDIX G:	Written and Oral Comments and Responses
APPENDIX H:	Letter of Concurrence from the Arkansas State Historic Preservation Officer

LIST OF TABLES

Table 1.1.	Construction, operation, maintenance, and management activities studied in this Environmental Impact Statement.
Table 1.2.	Summary of issues and concerns associated with the development of Mt. Magazine.
Table 2.1.	Mt. Magazine EIS Environmental Review Committee.
Table 2.2.	Summary of Alternatives Studied in the Mt. Magazine EIS.
Table 2.3.	Comparison of effects by alternative, Mt. Magazine EIS.
Table 3.1.	Status of plant species on Mt. Magazine being studied for possible federal listing.
Table 3.2.	List of U.S. Forest Service PETS plant species known from Mt. Magazine.
Table 3.3.	List of plant species of State concern occurring on Mt. Magazine.
Table 3.4.	List of U.S. Forest Service PETS vertebrate species and State species of concern which occur or have the potential to occur within the areas considered for development on Mt. Magazine.
Table 3.5.	Species of invertebrates listed by federal or state agencies that are known to occur on Mt. Magazine and their status rating.
Table 3.6.	Summary of archeological sites and historic properties on Mt. Magazine.
Table 3.7.	Population of the primary employment area.
Table 3.8.	Population of the secondary employment area.
Table 3.9.	Educational characteristics of area of economic impact, 1980.
Table 3.10.	Total personal income estimates.
Table 3.11.	Per capita personal income estimates.
Table 3.12.	Labor force characteristics, 1980.
Table 3.13.	Industry of employed persons, 1980.
Table 3.14.	Industry of employed persons, 1980 (in percentages).
Table 3.15.	Percent unemployment rates 1980-1990.
Table 3.16.	Worker's commuting patterns, 1980.
Table 4.1.	Estimated economic effects to the primary impact area of Mt. Magazine for Alternative B.
Table 4.2.	Estimated economic effects to the primary impact area of Mt. Magazine for Alternative C.
Table 4.3.	Estimated economic effects to the primary impact area of Mt. Magazine for Alternative D.
Table 4.4.	Estimated economic effects to the primary impact area of Mt. Magazine for Alternative E.

LIST OF FIGURES

- Figure 1.1. Location and vicinity of Mt. Magazine.
- Figure 2.1. Location of the Sepcial Interest Area on Mt. Magazine.
- Figure 2.2. Alternative A - No action/no change alternative.
- Figure 2.3. Alternative B - Historical level of development.
- Figure 2.4. Alternative C - Development expanded for scientific research and educational use.
- Figure 2.5. Alternative D - Development for recreational, educational and scientific use with minimum facilities.
- Figure 2.6. Alternative E - Development for recreational, educational and scientific use with maximum occupancy of facilities.
- Figure 3.1. Topographic map of Mt. Magazine.
- Figure 3.2. Plant communities of Mt. Magazine.
- Figure 3.3. Geographic distribution of the Magazine Mountain shagreen (*Mesodon magazinensis*), Mt. Magazine EIS (modified from Caldwell 1986).
- Figure 3.4. Area of economic impact.
- Figure 3.5. Unemployment rates 1980-1990.
- Figure 4.1. Location of proposed water line, access roads, and water tower.

1.0 PURPOSE AND NEED

1.1 Purpose and Need

The purpose and need for this project is to provide a level of developed recreation in cooperation with Arkansas Department of Parks and Tourism on top of Mt. Magazine to meet local desires for lodge-type and associated recreation facilities while protecting the Mountain's environment as directed by the Forest Plan and Record of Decision.

1.2 Overview of Development on Mt. Magazine

Mt. Magazine is located in southeast Logan County, Arkansas, approximately 55 miles southeast of the City of Fort Smith and 100 miles northwest of the City of Little Rock (Figure 1.1). Since the mid-1800s, various levels of habitation and development have occurred on this Mountain. In 1900, the Town of Mt. Magazine was platted on the Mountain and the Skycrest Hotel was constructed on the west end. In subsequent years, other accommodations, including the notable Buckman Inn with its swimming pool, were constructed on the Mountain. Mt. Magazine soon became a popular recreational destination for both local and out-of-state visitors (Arkansas Department of Parks and Tourism 1989; USDA Forest Service 1988a).

During the Depression, development and recreation on the Mountain halted and the hotels fell into disrepair. In 1934, the federal government acquired the Mountain under the United States Resettlement Administration and turned it over to the U.S. Forest Service (USDA Forest Service 1988a). Between 1938 and 1941, several developments were undertaken by the Civilian Conservation Corps (CCC), including a lodge, a restaurant, and cabins on the south side of the plateau, and campsites and picnic areas. The lodge was operated until it burned in 1971 (Arkansas Department of Parks and Tourism 1989). Currently, day and short-term overnight use of the Mountain's facilities occur for recreation and scientific work by local and out-of-state residents.

1.3 History of Redevelopment Efforts

Since the lodge burned in 1971, there has been strong local and regional support to re-establish the lodge on Mt. Magazine. In 1961, Governor Orval Faubus requested that Mt. Magazine be turned over to the Arkansas Department of Parks and Tourism for development. By 1975, the U.S. Forest Service completed a feasibility study for the development of the mountaintop. The barriers to development identified in the feasibility study were insufficient water supply, road improvements, and general access. Since that time, all but one of these issues (i.e., water supply) have been resolved.

In 1976, the Arkansas Department of Parks and Tourism conducted a feasibility study of establishing a state park on Mt. Magazine and recommended that the U.S. Forest Service rebuild the lodge or consider making the area available to the Arkansas Department of Parks and Tourism for the development of a state park. In 1977, a formal request to turn Mt. Magazine over to Arkansas Department of Parks and Tourism was made again to the U.S. Forest Service by then Governor David Pryor and Senator Dale Bumpers. This request was supported by a resolution by the Arkansas General Assembly and approved by Governor Pryor (USDA Forest Service 1988a).

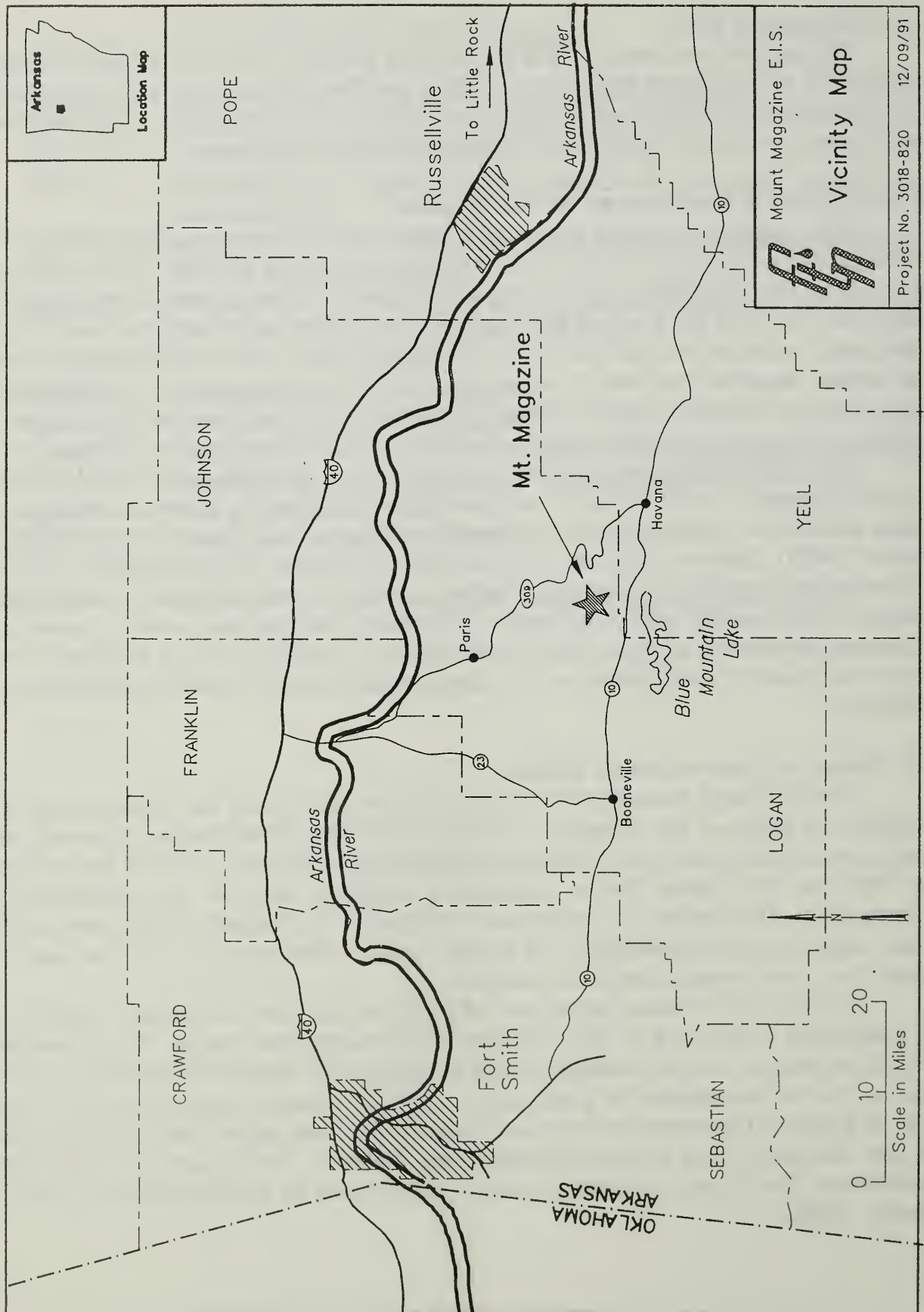


Figure 1.1. Location and vicinity of Mt. Magazine.

During 1977 through 1982, the U.S. Forest Service again studied options for redevelopment of the Mountain. In 1979, they completed an Environmental Impact Statement (EIS) which evaluated alternatives for development and management of 2,200 acres on top of Mt. Magazine (USDA Forest Service 1979). Shortly thereafter, the U.S. Forest Service determined it did not have funding for development.

Solicitations were made to the private sector for development, as outlined in the 1979 EIS. No offers were received from concessionaires for development of the Mountain or for operation of recreational facilities (i.e., hotel/lodge, restaurant).

In 1983, the Arkansas Department of Parks and Tourism presented a prospectus for development of Mt. Magazine to the U.S. Forest Service. That same year, the Arkansas General Assembly authorized the Arkansas Department of Parks and Tourism to establish Mt. Magazine State Park (USDA Forest Service 1988a).

On 25 April 1989, a Memorandum of Understanding (MOU) was signed between the U.S. Forest Service and the Arkansas Department of Parks and Tourism. This MOU was established to strengthen the cooperative efforts between the U.S. Forest Service and the Arkansas Department of Parks and Tourism to preserve, protect, and enhance the ecological and cultural resources of Mt. Magazine, while promoting recreational use. A special use permit also was granted to the Arkansas Department of Parks and Tourism by the U.S. Forest Service which permits the development and operation of a state park on approximately 2,200 acres of U.S. Forest Service lands on the Mountain pending the outcome of a new EIS.

The 1979 Mt. Magazine EIS disclosed the effects on the human environment of five recreational development levels on Mt. Magazine and selected a preferred level of development and the facilities needed to support it. Since the completion of the 1979 EIS new information on the biological and cultural resources of Mt. Magazine became available through continued study of the Mountain. The state park proposal described in the prospectus was possibly outside the range of alternatives described in the 1979 EIS, and controversy had grown concerning redevelopment of the Mountain. As a result, the U.S. Forest Service determined it was necessary to prepare an updated EIS.

1.4 Proposed Action

The proposed action is to permit Arkansas Department of Parks and Tourism to develop and operate a lodge, cabins, restaurant, pool and conference center with associated water and sanitation facilities, in the vicinity of the former lodge and cabin site; to improve existing camping and picnic facilities; and add hiking trails, administrative and visitor information facilities to meet visitor needs as described in detail in Alternative D.

1.5 Decision to be Made

The decision to be made is whether or not to permit Arkansas Department of Parks and Tourism to develop and operate a State Park on Mt. Magazine, and if so, what facilities in which locations on the Mountain to provide desired recreation experiences while protecting the Mountain environment.

1.6 Activities Addressed

Addressed in this EIS are the environmental consequences of the construction, operation, maintenance, and management activities that have been identified at this time. The specific construction, operation, maintenance, and management activities evaluated in this EIS are listed in Table 1.1. Because the preparation of site-specific, detailed development and construction plans is a state park planning activity, they were not prepared in conjunction with this EIS, and the specific locations of individual structures or facilities are not provided. Instead, this EIS examines the effects of various levels of construction, operation, maintenance, and management activities over broad areas where these activities are likely to occur.

Currently, it is impossible to identify all operation and maintenance activities that may take place on the Mountain. As required under the MOU, the Arkansas Department of Parks and Tourism will develop detailed and resource-specific management plan for the resources of the Mountain. This plan will be prepared by an interdisciplinary team comprised of several state and federal agency personnel, as well as scientists and other experts on the resources of Mt. Magazine. If a state park is established on Mt. Magazine, this resource management plan will be completed within two years of establishment of the park.

1.7 Issues and Concerns

Public listening sessions (scoping sessions) were held in December 1989 to receive comments regarding the concerns and issues associated with the proposed action. Oral comments were received during these sessions. Written statements were also received during this period. Public comments were summarized by the U.S. Forest Service according to standard procedures in the U.S. Forest Service Handbook 1609.13 (USDA Forest Service 1985). Concerns were consolidated into six major issues: economics; opportunities for public use; environmental protection; effects on proposed, endangered, threatened or sensitive (PETS) species; location of developments; and preservation of cultural heritage. These issues and concerns form the basis of the development of alternatives for the proposed action and for the decisions made on the proposed action by the Ozark-St. Francis National Forests Supervisor. A summary of the issues and concerns raised by interested individuals and parties is provided in Table 1.2.

1.8 Compliance with Laws and Regulations

No conflicts of the proposed action occur with U.S. Forest Service environmental policies and procedures for use of lands of the Ozark-St. Francis National Forests, state and local laws, regulations, or ordinances, requirements of the Endangered Species Act (1973) as amended, and cultural resource legislation. The proposed action is consistent with the Land and Resource Management Plan for the Ozark-St. Francis National Forests (1989g) with the exception of 1.4 miles of road construction in the Mt. Magazine Special Interest Area. The effects of this road construction are disclosed in this document. A decision to implement Alternatives B through E will constitute a minor correction to the Plan.

Table 1.1. Construction, operation, maintenance, and management activities studied in this EIS.

CONSTRUCTION ACTIVITIES	
Clearing Grading Excavation Paving (roads and parking areas) Building	Landscaping Habitat protection Drainage Heavy equipment operation Storage/staging
OPERATION & MAINTENANCE	
Structure/equipment maintenance Line/right of way maintenance Road/parking area maintenance <ul style="list-style-type: none"> • physical upkeep • seasonal maintenance (plowing/sanding) Wildlife management and control Fire control Landscape maintenance Species monitoring and protection Habitat management and protection <ul style="list-style-type: none"> • plant • animal • ponds/quarry Wastewater disposal	Enforcement (on-site) Recreational area use and maintenance <ul style="list-style-type: none"> • trails • camp units • picnic units • tennis courts • pool • 19th century homestead • hang glider/astronomy site • rock climbing site • overlooks Educational programs Permit administration Restricted use areas Solid waste management Cultural resource protection

Table 1.2. Summary of issues and concerns associated with the development of Mt. Magazine.

NEED TO PROTECT THE ENVIRONMENT	
<ul style="list-style-type: none"> • Environmental impacts and effects will be long-term and cumulative • Developed areas should be separated from sensitive plants, animals, and communities • Impacts on environment should be analyzed outside area of development including Special Interest Area 	<ul style="list-style-type: none"> • Impacts of maintenance and operation during and after construction should be studied • Monitoring of environment should continue after development of park • Balance protection of environment and development of park • Black bear and other wildlife management, etc.
IMPACT ON PETS* SPECIES	
<ul style="list-style-type: none"> • Determine inventory needs • Determine management requirements necessary for species viability 	<ul style="list-style-type: none"> • Use information on PETS species to determine placement of improvements • Use information on PETS species to develop biological evaluation
LOCATION OF DEVELOPMENTS	
<ul style="list-style-type: none"> • Locate facilities off Mountain, either Corley or Cove Lake 	<ul style="list-style-type: none"> • Locate facilities to mitigate effects on sensitive resources
PRESERVATION OF CULTURAL HERITAGE	
<ul style="list-style-type: none"> • New development will help recapture feelings of history of the Mountain 	

Table 1.2. Continued.

OPPORTUNITIES FOR PUBLIC USE	
<ul style="list-style-type: none"> ● Beauty and uniqueness should be shared ● Lodge should be built ● Development will make the Mountain more accessible to a larger visitor base ● What is the highest/best use? ● Will provide environmental education opportunities 	<ul style="list-style-type: none"> ● Need vehicle access to points of interest ● Diverse recreation opportunities such as hang gliding, horseback riding, hiking and scenic viewing can be regulated and enhanced by development of a state park ● Hunting opportunities and access
ECONOMICS	
<ul style="list-style-type: none"> ● Boost to local and regional economy ● Creates job opportunities/supplemental income ● Promotes tourism ● Creates a larger tax base ● A lodge and cabins may compete with existing facilities 	<ul style="list-style-type: none"> ● Need economic analysis of degree of direct competition with existing recreation facilities ● Economic benefits are short-term ● Cost benefit ratio for each developmental level ● Will Arkansas Department of Parks and Tourism's budget for maintenance and operation be sufficient after construction?

* Proposed, Endangered, Threatened and Sensitive (PETS) Species.

1.9 Contents of this EIS

This EIS was prepared in accordance to the requirements of the National Environmental Protection Act (NEPA) of 1969 as Amended, the Council on Environmental Quality (CEQ) regulations for the preparation of an EIS, and the U.S. Forest Service environmental policy and procedures, land use, planning, and management guidelines (USDA Forest Service 1985, 1988b, 1989 e&f.). This FEIS provides information on the potential environmental and cultural effects of the proposed action and considers whether this action meets the goals of the U.S. Forest Service. Chapter 1.0 provides the history and an overview of the proposed action. Chapter 2.0 describes how the development alternatives were formulated, explains which alternatives were considered for further study and how these alternatives were selected, and compares the alternatives to provide an opportunity for objective evaluation of the alternatives. Chapter 2.0 also summarizes the environmental effects (consequences) of the alternatives and identifies the preferred alternative(s). Chapter 3.0 describes the environment affected by the proposed action and the alternatives under consideration. Chapter 4.0 describes the site-specific environmental consequences of the alternatives and forms the scientific and analytical basis for comparisons of the alternatives in Chapter 2.0. Mitigation measures necessary to protect and preserve biological, ecological, and cultural resources during construction and operation and maintenance activities are also outlined in Chapter 4.0. Chapter 5.0 lists the preparers of the EIS; Chapter 6.0 lists the agencies, organizations, and interested persons to whom the draft EIS (DEIS) was sent; and Chapter 7.0 provides an analysis and summary of the written and oral responses to the DEIS and of the demographics of the respondents. Chapter 8.0 provides a list of references used in the preparation of this EIS. Several appendices contain data, information, and methods used in the identification and analysis of environmental effects, field methodologies, and additional reports that have a bearing on this EIS.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes how the alternatives were developed, and presents those that were studied in more detail in this EIS. This chapter also presents the alternatives that were considered but eliminated from further study, the preferred alternative, and compares and contrasts the final alternatives studied in this report.

2.2 Alternatives Development

Five final alternatives representing different development strategies for the 2,200 acres of Mt. Magazine covered under the special use permit (see Chapter 1.0) were selected for further study in this EIS. The final alternatives, developed over a nine-month period, are based on the following:

- Arkansas Department of Parks and Tourism 1988 Prospectus for Mt. Magazine State Park (Arkansas Department of Parks and Tourism 1988).
- Management concerns and requirements set forth in the special use permit.
- Public comments from public listening sessions held in December, 1989, and in June and July, 1990.
- Environmental Review Committee (ERC) comments on draft alternatives developed in September, 1990 (see Table 2.1 for ERC members).
- Available information and data on Mt. Magazine, particularly on its environmental and cultural resources.
- Presence and location of PETS species.
- Presence and location of important cultural resources.
- Previous engineering feasibility studies (Graham Inc. 1981).
- Impacts of the alternatives on the Special Interest Area (Figure 2.1) and on proposed Research Natural Area (RNA) on the slopes of Mt. Magazine.

The five alternatives were derived via a lengthy process during which multiple issues, comments, and concerns were considered. Comments obtained during the December, 1989, public listening sessions were reviewed from April through May, 1990. Six major issues were consolidated from public comments received during the December, 1989, public listening sessions:

- Environmental protection,
- Impacts on PETS species,
- Location of developments,
- Preservation of cultural heritage,
- Economics, and
- Opportunities for public use.

In June and July, 1990, additional public listening sessions were held at Mt. Magazine and in Little Rock, respectively, to receive specific comments about the locations and levels of

Table 2.1. Mt. Magazine EIS Environmental Review Committee.

Arkansas Natural Heritage Commission 225 East Markham Street Little Rock, Arkansas 72201 (501)-324-9332	Mt. Magazine Association Post Office Box 425 Booneville, Arkansas 72927 (501)-675-2100
Arkansas Nature Conservancy Director of Protection 300 Spring Street, Suite 717 Little Rock, Arkansas 72201 (501)-372-2750	Arkansas Conservation Coalition Route Two, Box 659 Hensley, Arkansas 72065 (501)-397-5576
Arkansas Game and Fish Commission Chief, River Basins Section Two Natural Resources Drive Little Rock, Arkansas 72201 (501)-223-6314	Arkansas River Valley Area Council (ARVAC) 124 North Elm Street Paris, Arkansas 71855 (501)-963-6834
United States Fish and Wildlife Service 900 Clay Street, Room 235 Vicksburg, Mississippi 39180 (601)-634-5995	Arkansas Wildlife Federation 7905 Cantrell Road, Room 226 Little Rock, Arkansas 72207 (501)-663-7255
Arkansas Historic Preservation Program 225 East Markham, Suite 700 Little Rock, Arkansas 72201 (501)-371-2763	Arkansas Department of Parks and Tourism One Capitol Mall Little Rock, Arkansas 72201 (501)-682-6938
United States Forest Service Magazine Ranger District Post Office Box 511 Paris, Arkansas 72855 (501)-963-3076	



Figure 2.1. Location of special interest area.

development, and recreational uses that were desirable on the Mountain. The six major issues, raised by management concerns of and proposals from Arkansas Department of Parks and Tourism and the United States Forest Service, were used to form the boundaries for the level of development, types of facilities, and recreational uses for the Mountain. A set of five draft alternatives was developed from this information. These alternatives were reviewed by Arkansas Department of Parks and Tourism, the United States Forest Service, and the ERC in September, 1990.

A meeting was held on the Mountain in December, 1990, to identify specific locations of unique features, and PETS species. Participants included personnel from the United States Fish and Wildlife Service, Arkansas Department of Parks and Tourism, United States Forest Service, Arkansas Natural Heritage Commission, The Nature Conservancy, Mt. Magazine Association, and other scientists and experts on the biological and geological features of the Mountain.

The draft alternatives were modified based on comments and concerns expressed during these meetings. The five revised alternatives developed for the Mt. Magazine DEIS attempted to balance the issues brought forth over the previous nine-month period. These alternatives are presented in Section 2.4. Each alternative that included lodging facilities initially contained three alternate sites for field evaluation and study.

In accordance with the NEPA process, alternatives were considered or modified during the preparation of the FEIS based on the written and oral comments received following public review of the DEIS.

Site-specific effects were identified during the 1991 field season. Based on the results of the field surveys, locations of developments were either moved or eliminated to avoid any potential adverse effects on the Mountain's resources. Consequently, actions, locations, or uses originally proposed in the revised alternatives in February, 1991, were eliminated or removed from further consideration or detailed study. Those actions, locations, and uses, and the rationale for their removal are presented in Section 2.3 below.

2.3 Alternatives Eliminated From Further Study

- 1) Wilderness Area - Several comments suggested that Mt. Magazine be treated as a wilderness area, and that the area be off limits to any further access. This suggestion was considered unreasonable, and was not considered for further study because: (1) Mt. Magazine has a long history of use as a tourist destination, and is a popular local site for daytime recreational and educational uses; (2) roads and parking exist on the Mountain, encouraging visitors; and (3) Highway 309, that connects Paris on the north to Havana on the south, was designated in 1990 as a United States Forest Service Scenic Byway. Mt. Magazine, therefore, will exist as a natural attraction for local, out-of-town, and out-of-state visitors. For these and other reasons, setting aside Mt. Magazine as a wilderness area was not considered for further study.
- 2) Lodging and other developments to be placed off-site (particularly at Cove Lake)
- This alternative was examined, and eliminated for further study because it does

- not meet the purpose and need of this EIS, and is outside the legislation authorizing the establishment of an Arkansas State Park on Mt. Magazine.
- 3) One-hundred-room lodge, 60-90 campsites - An alternative containing this level of lodging was eliminated from further study because it would be too expensive to build and operate, and the Arkansas Department of Parks and Tourism felt the needs and attractions would not be such that it could be filled to capacity.
 - 4) Proposed lodge site on Mossback Ridge - Three alternate locations for a lodge and cabins were identified in January, 1991, and studied throughout the 1991 field season. One of these three locations, the Mossback Ridge lodge and cabins site, was eliminated from further study based on: (1) direct, indirect, and cumulative effects of construction on the flora and fauna (both vertebrates and invertebrates) of the Mountain; (2) construction costs; (3) disturbance to a high-quality mesic oak-hickory forest; (4) interference with rich and diverse invertebrate populations; (5) effects on existing wildlife pond; and (6) effects on the headwaters of Shoal Creek in the Bear Hollow drainage.
 - 5) West end of the Mountain - Much concern exists over the sensitivity of the geologic, hydrologic, and botanical features found on the west end of the Mountain. The entire west end of the Mountain from the intersection of Forest Development Roads 1606 and 1636 was eliminated from further consideration in the alternatives, and was considered to be excluded from all further development on the Mountain.
 - 6) Proposed water line and utilities up the western side of the Mountain - This alternative was examined in detail, and eliminated from further study based on: (1) construction costs; (2) length of line required; (3) number of required easements across private property; (4) direct and indirect effects of construction to the west end of the mountaintop, an area whose resources merit protection; (5) creation of improved access to, and potential visitation of, the west end of the Mountain; and (6) location within the existing designated Special Interest Area.
 - 7) Horse trail across the top of the Mountain - Conversations with the Arkansas Trail Riders Association during the June and July, 1990, public listening sessions revealed their interest in the development of a horse trail across the top of Mt. Magazine and down the west end through Huckleberry Flats. A seven-mile trail was initially included in several alternatives. As further study of the Mountain progressed during 1991, it became evident that the construction and maintenance of a horse trail across the top of Mt. Magazine would have adverse, direct, and indirect, as well as long-term effects, on a number of resources including botanical, vertebrate, invertebrate, and archeological and historical resources. Because of these effects and because of issues raised regarding the sensitivity of the west end of the Mountain, the horse trail across the top of the Mountain and down the west end through Huckleberry Flats was eliminated from further study. The existing trail used by the horse groups, and previously permitted by the United States Forest Service, was maintained in the final alternatives.

- 8) Leave Mt. Magazine the way it is, but increase control of visitors through patrols, residential personnel, group limitations, fees, gates, registrations, and other visitor controls - While this alternative, suggested by two responses, does at least partly address the issues of Environmental Protection, Impacts on PETS Species, and Preservation of Cultural Heritage, it does not substantially address the issues of Opportunities for Public Use and Economics any more than the No Action, No Change, Alternative A. It also does not meet the purpose and need of the proposed action, and is outside the legislation authorizing the establishment of an Arkansas State Park on Mt. Magazine.

2.4 Presentation of Final Alternatives Studied

The alternatives considered for detailed study in this EIS include:

- Alternative A - No Action, No Change, Alternative.
- Alternative B - Historical level of development.
- Alternative C - Development expanded for scientific research and educational use.
- Alternative D - Development for recreational, educational, and scientific use with minimum facilities. This alternative is the preferred alternative.
- Alternative E - Development for recreational, educational, and scientific use with greatest number of facilities while maintaining maximum occupancy of facilities.

Table 2.2 provides a summary of the features of each of the alternatives studied in this EIS.

2.4.1 Alternative A

Alternative A is the No Action, No Change, Alternative. Under this alternative, the United States Forest Service would continue daily operations according to the Land and Resources Management Plan for the Ozark-St. Francis National Forests (1989g). This level of management includes, but is not limited to, the following: maintenance of existing facilities, trails, structures, and grounds; continuation of waste collection services; recreational use and species inventories; limited species, habitat, and vegetation management and protection; and limited enforcement. The sides of the Mountain (i.e., from the bluff line to 1,600-ft. elevation), currently designated as a Special Interest Area (Figure 2.1), will continue to be studied by the United States Forest Service for RNA status. If the RNA status is achieved, additional resource protection will result for the surrounding slopes. Specifically, vehicular access to the RNA will be restricted; a permit system will be implemented for scientific study; and construction of trails, corridors, and new utilities, and habitat and timber management will be prohibited. Under the No Action, No Change, Alternative, environmental monitoring (specifically monitoring of PETS species) will remain the responsibility of the United States Forest Service; however, joint monitoring by several federal and state agencies may be possible. This alternative (Figure 2.2) provides for the following:

- 1) 18 existing camp units at Cameron Bluff Campgrounds.

Table 2.2. Summary of alternatives studied in the Mt. Magazine EIS.

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Developments/Facilities					
Gift Shop		lodge	visitor center	visitor center & lodge	visitor center & lodge
Library			visitor center		
Camp Units (Cameron Bluff)	18 (Class B)	18 (Class B)	18 (Class B)	18 (Class A)	20 - 40 (Class A)
Camp Units (Quarry Area)			20 (Class A)	20 (Class A)	20 (Class A)
Picnic Units	22	22	22	22 - 35	25-40
Trails	~5 miles	~5 miles	~5 miles	add 5 - 8 miles	add 5 - 8 miles
Overlooks	8	8	8	8, improve	8, improve
Roads/Parking	existing	improve, minor additions	improve, minor additions	improve, minor additions	improve, minor additions
Utilities	existing elec., solid waste	telephone, elec., water, solid waste, WWTP	telephone, elec., water, solid waste, WWTP	telephone, elec., water, solid waste, WWTP	telephone, elec., water, solid waste, WWTP
Lodge		18 - 20 rooms	group facilities	40 - 60 room	60 - 90 room
Conference Center			yes	yes	yes
Restaurant		yes	yes	yes	yes
Meeting Rooms		yes, at lodge	yes, at conference center & visitor center	yes, at lodge	yes, at lodge & visitor center
Cabins		18	w/in conference center complex	5 - 15	10 - 20

Table 2.2. Continued.

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Bathhouse				2	2
Toilets	4	improve, add 2	improve, add 3	improve, add 3	improve, add 3
Pool				yes	yes
19th Century Homestead				yes	yes
RV Sanitary Station				yes	yes
Amphitheater	0	1	1	1	2
Visitor Center		yes	yes	yes	yes
Employee Residence		3	3	4	4
Maintenance Bldg.		yes	yes	yes	yes
Pavilions			yes	yes	yes
Gate House			yes		
Tennis Courts					yes
Laboratory		staff use	multiple use	multiple use	multiple use
Auditorium		visitor center	visitor center	visitor center	visitor center
Uses					
Horseback	yes, desg. area	yes, desg. area	yes, desg. area	yes, desg. area	yes, desg. area
Hang Gliding	yes, no desg. area	yes, desg. area	yes, desg. area	yes, desg. area	yes, desg. area
Rock Climbing	yes, north & south	yes, south only	yes, south only	yes, south only	yes, south only
Educational Program		yes	yes	yes	yes

Table 2.2. Continued.

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Astronomy	no facilities provided	no facilities provided	no facilities provided	facilities provided	facilities provided
Hunting	4 access	2 access	2 access	2 access	2 access
Administrative					
Full-time Employees	0	20	21	26	28
Restricted Use Areas	no	yes	yes	yes	yes
Management Agency	USFS	ADPT	ADPT	ADPT	ADPT
On-site Enforcement		yes	yes	yes	yes
Environmental Monitoring	USFS	multi-agency	multi-agency	multi-agency	multi-agency
Study Permits	yes	yes	yes	yes	yes

WWTP = Wastewater Treatment Plant.

ADPT = Arkansas Department of Parks and Tourism.

USFS = U.S. Forest Service.

Class A =

Water, electric hookups, paved parking spur, fire ring, lantern pole, picnic table and tent pod are provided at each camp unit. Sites can be for tent, or combination tent/RV use. Flush toilets and showers are located in campground.

Class B =

Fire ring, lantern pole, picnic table and tent pod are provided at each camp unit. Toilets and water spigots are located in campground. Camp units may be directly accessible by vehicle or by hiking a short distance.

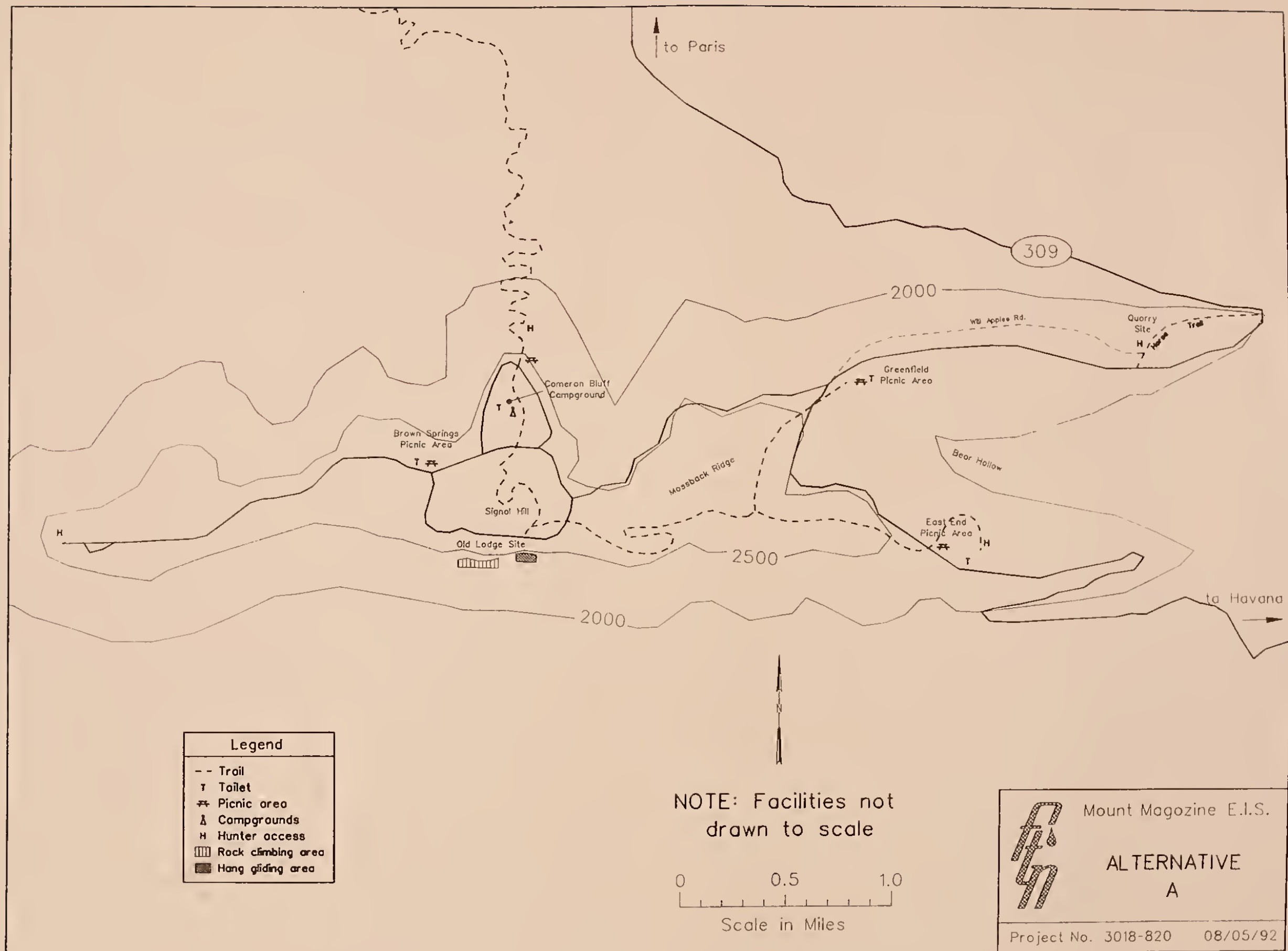


Figure 2.2. Alternative A - No Action, No change Alternative

- 2) 22 existing picnic units at East End Picnic Area, Greenfield Picnic Area, and Brown Springs Picnic Area.
- 3) Existing hiking trails (approximately 5 miles).
- 4) Eight existing overlooks.
- 5) Existing recreational use by horseback-riding groups, hang gliders, and rock climbers.
- 6) Existing roads and parking.
- 7) Existing utilities.
- 8) Daily management to remain with United States Forest Service.

2.4.2 Alternative B

Alternative B was developed in response to public input that favored the reconstruction of mountaintop facilities that had historically been present on the Mountain. Specific facilities to be replaced under this alternative include a lodge with restaurant and meeting rooms, and cabins. As required under the special-use permit, a visitor information center and residences for full-time staff were added. The original location of these facilities on the south side of the mountaintop was studied in detail. Scientific study and recreational use will continue under this alternative; however, designated restricted areas on the top of the Mountain, and environmental education programs (interpretive programs) will be added to enhance resource protection. Facilities will be added or upgraded for public health protection (sanitary purposes) in recreational-use areas. Utilities (water, electricity, and telephone) will be reestablished on the mountaintop for service and for fire protection.

Under this alternative, the daily management of Mt. Magazine would become the responsibility of the Arkansas Department of Parks and Tourism. Resource management, and species monitoring and protection, however, will be jointly conducted by the Arkansas Department of Parks and Tourism, the United States Forest Service, and possibly other state or federal agencies. This alternative provides for the following (Figure 2.3):

- 1) 18 existing camp units at Cameron Bluff Campground.
- 2) 22 existing picnic units at East End Picnic Area, Greenfield Picnic Area, and Brown Springs Picnic Area.
- 3) Existing hiking trails (approximately 5 miles).
- 4) Eight existing overlooks.
- 5) Existing recreational use by horseback-riding groups, hang gliders, and rock climbers.
- 6) Reduction of four hunter access points on top of the Mountain to two access points.
- 7) Existing roads and parking, with improvements and expansion as needed.
- 8) Improved toilets at existing recreational-use and picnic areas.
- 9) Toilets at hang-gliding area and at northeast quarry area for horseback riders.
- 10) 18-22-room lodge with deck, restaurant, meeting rooms, lodge management living quarters and facilities, and gift shop, etc.
- 11) 18 cabins.

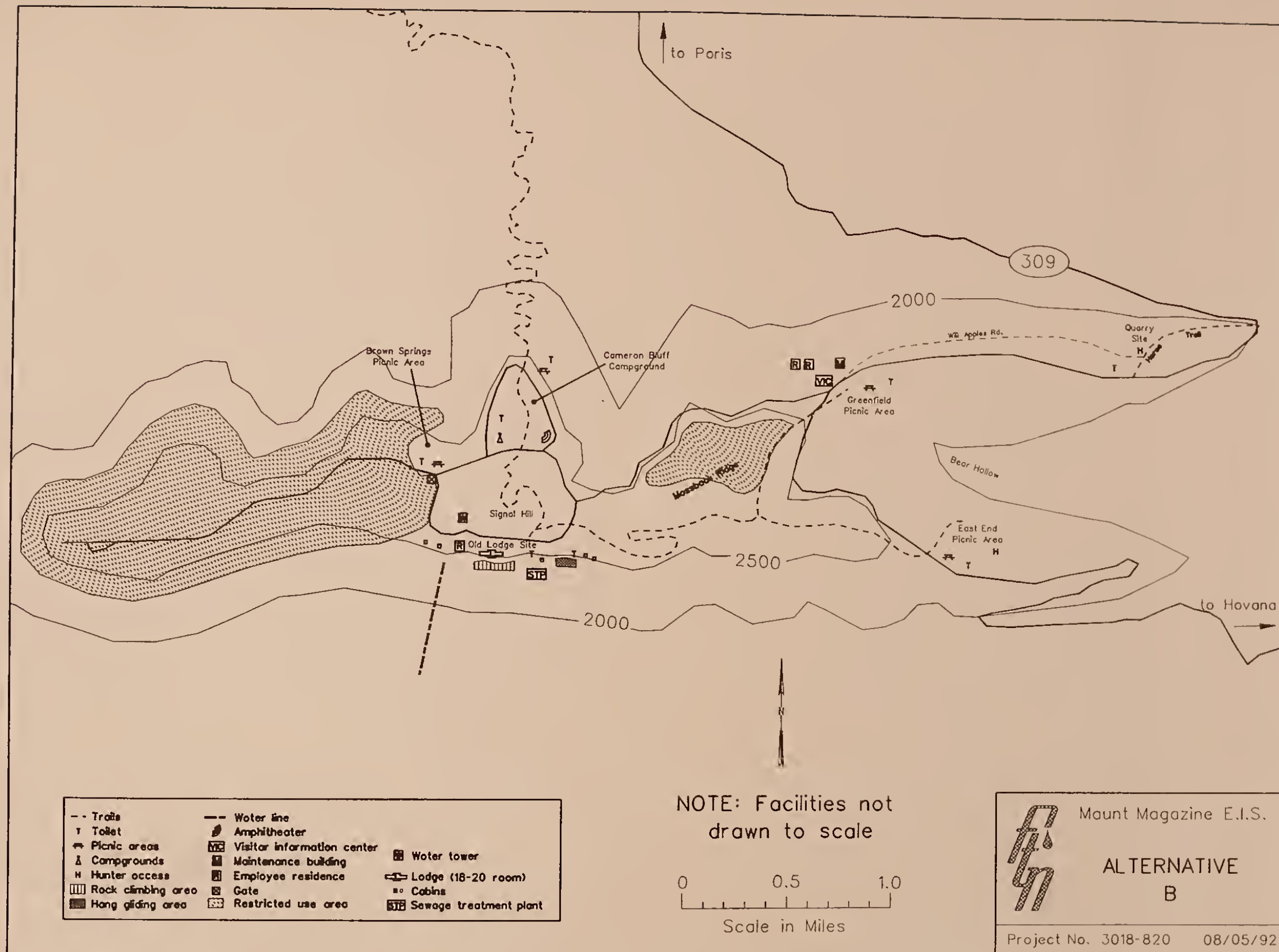


Figure 2.3. Alternative B - Historical level of development.

- 12) Visitor information center with staff offices, laboratory, auditorium, rest rooms, and exhibit and display areas.
- 13) Three employee residences (one at lodge area, and two at the visitor information-center area).
- 14) Maintenance building.
- 15) Amphitheater at lodge or campground area.
- 16) Utilities including water, telephone, electricity, sewage treatment or collection, and solid-waste collection.
- 17) Environmental education/interpretive programs.
- 18) Designated restricted-use areas.
- 19) Permit system for scientific study and research.

2.4.3 Alternative C

Alternative C was developed in response to input from federal and state agencies, private organizations, and the public for development of Mt. Magazine for expanded scientific research and environmental education. To balance this type of use and the goal of environmental protection, use of the Mountain by the public and scientific research, educational, and conservation organizations could be regulated through a registration/reservation system. Under this alternative, use of Mt. Magazine by scientific research, educational, and conservation organizations could be promoted by providing group facilities designed to support the activities of these groups (e.g., expanded classroom and educational laboratory facilities, group bunkhouse, group campgrounds, conference-center complex with lodge or cabins, and restaurant). The locations studied for these facilities included the south side of the mountaintop where the previous lodge had been built, and a second location overlooking Bear Hollow and located off Highway 309 east of Greenfield Picnic Area (Figure 2.4).

Under this alternative, the management and monitoring of Mt. Magazine's resources would be a cooperative effort between the Arkansas Department of Parks and Tourism and the United States Forest Service, with the daily management of the Mountain being the responsibility of the Arkansas Department of Parks and Tourism. Management techniques for resource protection will most likely include expanded educational/interpretive programs relative to Alternative B, joint enforcement by the Arkansas Department of Parks and Tourism and United States Forest Service personnel, designated protected/restricted-use areas, and restricted access to, and study of, unique features or sensitive areas through a permit system. Current facilities and uses studied under this alternative include (Figure 2.4):

- 1) 18 existing camp units at Cameron Bluff Campground.
- 2) 22 existing picnic units at East End Picnic Area, Greenfield Picnic Area, and Brown Springs Picnic Area.
- 3) Existing hiking trails (approximately 5 miles).
- 4) Eight existing overlooks.
- 5) Existing roads and parking, with improvements and new roads as needed.
- 6) Existing recreational uses by horseback groups, hang gliders, and rock climbers.

The following facilities and programs were also studied under this alternative:

- 1) Visitor information center with staff offices, multi-purpose research/teaching laboratory, library, meeting rooms/classrooms, auditorium, rest rooms, and exhibit and display areas.
- 2) Amphitheater and/or pavilions for staff and group use.
- 3) Conference center with lodging facilities for individual or group usage (e.g., lodge, group bunkhouses, cabins), meeting/conference rooms, management living quarters and facilities, and restaurant.
- 4) Three employee residences (one at conference center, and two at the visitor information center).
- 5) Maintenance building.
- 6) Gate house at park entrance.
- 7) Toilets at recreational- and other-use areas.
- 8) 20 camp units with water and electricity at the northeast quarry site for group use, horse trailers, and recreational vehicles.
- 9) Environmental monitoring by state and federal agencies.
- 10) Reduction of four hunter access points on the mountaintop to two.
- 11) Utilities including water, electric, telephone, sewage treatment or collection, and solid-waste collection.
- 12) Environmental education/interpretive programs.
- 13) Designated restricted-use areas.
- 14) Permit system for scientific study and research.

2.4.4 Alternative D (Preferred Alternative)

Alternative D provides the size facilities and operations necessary for economical, year-round operation and maintenance of a state park. Included in this alternative are a lodge, cabins, restaurant, pool, and conference center that would accommodate a larger number of occupants than those facilities proposed in Alternative B. The number of cabins, however, is decreased relative to the number in Alternative B. The locations studied for these facilities included the south side of the mountaintop where the previous lodge had been built, and a second location overlooking Bear Hollow and located off Highway 309 east of Greenfield Picnic Area. Also included in this alternative is a visitor information center, amphitheater, and a 19th-century homestead.

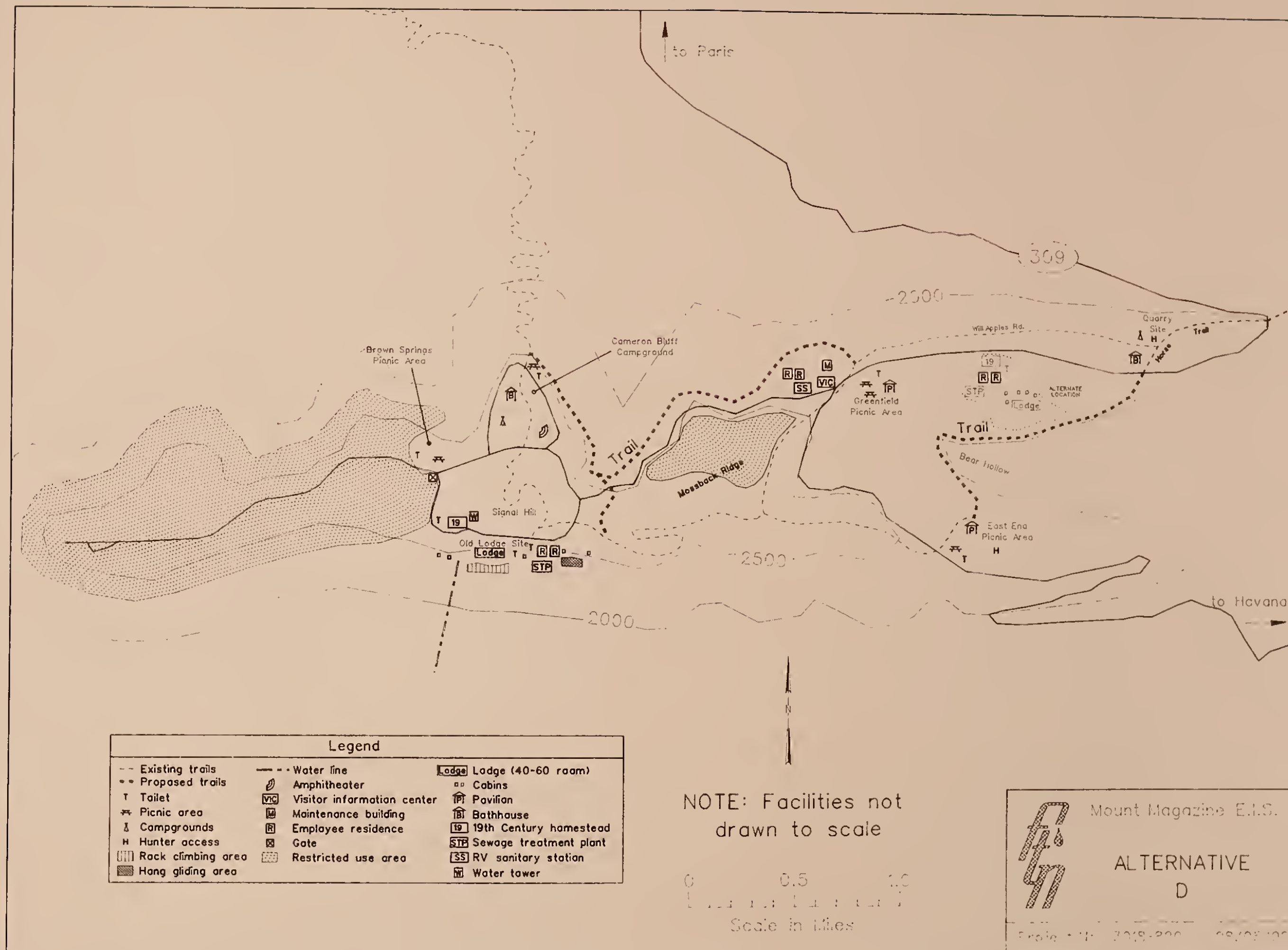
The 19th-century homestead would serve as a locus for the interpretation of Mt. Magazine's rich cultural heritage. Included in the design would be a small primitive cabin, a small garden, and perhaps an out building. Including the parking area needed to serve this facility, the total acreage will not exceed two acres.

Under this alternative, the number of campgrounds and picnic areas currently in existence on the Mountain would be increased, and their quality would be upgraded to Class-A sites. The construction of a horse camp at the northeast quarry area was also studied. Trail mileage is larger than in the previous alternatives, so that multiple trails and loop trails are available for hiking. As with the other alternatives, toilets will be constructed at the recreational-use areas for public health and sanitary purposes.

The management of Mt. Magazine will be a cooperative effort by the Arkansas Department of Parks and Tourism, and the United States Forest Service. Increased protection

of the Mountain's resources will be accomplished through administrative and management techniques that most likely will include increased educational and interpretive programs, permits for scientific study, regulated recreational use, restricted access to sensitive areas, habitat improvements, wildfire suppression, and increased enforcement by a full-time staff provided by the Arkansas Department of Parks and Tourism, and the United States Forest Service. This alternative provides for the following (Figure 2.5):

- 1) 18 camp units with bathhouse, water, and electricity.
- 2) 22-35 picnic units with toilets, pavilions, and running water (potentially five new sites at Greenfield Picnic Area).
- 3) 20 camp units at northeast quarry area for horse camp, with water, electricity, and bathhouse.
- 4) Additional 5-8 miles of hiking trails, of which 5.8 miles have been designated for a hiking trail along the bluff line (rim trail).
- 5) Improvement of eight existing overlooks.
- 6) Visitor information center with staff offices, meeting rooms/auditorium, exhibits and displays, gift area, rest rooms, and laboratory.
- 7) Designated recreational-use areas for hang gliding, rock climbing, and horseback riding trail in existing-use areas.
- 8) Designated astronomical lookout areas added.
- 9) Toilets at designated recreational-use areas.
- 10) Reduction of four hunter access points from the mountaintop to two.
- 11) 40-60-room lodge with deck, restaurant, meeting rooms and conference center, covered pool, management living quarters and office facilities, and gift shop, etc.
- 12) 5-15 cabins.
- 13) Four employee residences (two at visitor information center, and two at lodge site).
- 14) Maintenance building.
- 15) Amphitheater.
- 16) Utilities and services including water, electric, telephone, sewage treatment plant or sewage collection, and solid-waste collection.
- 17) Improvement of existing road corridors, and new roads and parking as needed.
- 18) 19th-century homestead.
- 19) Permit system for scientific study/research.
- 20) Recreational-vehicle sanitary stations.
- 21) Educational/interpretive programs.
- 22) Environmental monitoring by the Arkansas Department of Parks and Tourism, United States Forest Service, and other agencies.
- 23) Full-time, on-site enforcement personnel.
- 24) Designated restricted-use areas.



2.4.5 Alternative E

Alternative E proposes to provide a level of development in which the facilities and operations proposed can support the maximum capacity of occupants (i.e., without being too large to run at less than optimum capacity) while remaining economically feasible for sustained, year-round operation and maintenance. Similar to Alternative D, the following facilities are included in this alternative: lodge, cabins, restaurant, pool, conference center, visitor information center, amphitheater, 19th-century homestead, additional five-eight miles of new trails, and designated recreational-use areas with toilets. Under this alternative, tennis courts were also studied. The number of camp units, including the proposed multipurpose camp units at the northeast quarry, is increased over the number of units provided in Alternative D. Two sites were studied in detail as alternate locations for the construction of the lodge, cabins, and 19th-century homestead. These two sites were the location of the old lodge site, and a second location overlooking Bear Hollow and located off of Highway 309 to the east of Greenfield Picnic Area. The number of cabins under this alternative is increased relative to the number in Alternative D.

The management of Mt. Magazine will be a cooperative effort by the Arkansas Department of Parks and Tourism, and the United States Forest Service. Increased protection of the Mountain's resources will be accomplished through administrative and management techniques that most likely will include increased educational and interpretive programs, permits for scientific study, regulated recreational use, restricted access to sensitive areas, habitat, improvements, wildfire suppression, and increased enforcement by a full-time staff provided by the Arkansas Department of Parks and Tourism, and the United States Forest Service. Included in this alternative are the following (Figure 2.6):

- 1) 20-40 camp units with bathhouse, water, and electricity at Cameron Bluff Campground.
- 2) 20 camp units with bathhouse, water, electricity, and pavilion at the northeast quarry area off of Highway 309 for the horseback group (possible isolated stable area for horses).
- 3) 25-40 picnic units with toilets, running water, and pavilions at the existing picnic areas (four-ten units added at East End Picnic Area, five units at Greenfield Picnic Area).
- 4) Additional 5-8 miles of hiking trail, of which 5.8 miles have been designated for a hiking trail along the bluff line (rim-hiking trail).
- 5) Improvement of eight existing overlooks.
- 6) Visitor information center with staff offices, meeting rooms/classrooms, auditorium, exhibit and display areas, gift areas, rest rooms, and laboratory.
- 7) Designated recreational-use areas for hang gliding, and rock climbing, and astronomy areas with toilets.
- 8) Reduction of four hunter access points from mountaintop to two.
- 9) 60-90-room lodge with deck, restaurant, meeting rooms and conference center, covered pool, management living quarters, and gift shop, etc.
- 10) 10-20 cabins.



Figure 3.1. Topographic map of Mt. Magazine.

- 11) Four employee residences (two at the lodge site, and two at the visitor information center).
- 12) Maintenance building.
- 13) Two amphitheaters.
- 14) Utilities and services including water, electric, telephone, sewage treatment plant, and solid-waste collection.
- 15) Permit system for scientific study/research.
- 16) Recreational-vehicle sanitary stations at the visitor information center.
- 17) Educational interpretive programs.
- 18) Environmental monitoring by the Arkansas Department of Parks and Tourism, the United States Forest Service, and other agencies.
- 19) Improved or new roads and parking, as needed.
- 20) 19th-century homestead.
- 21) Two lighted tennis courts.
- 22) Full-time, on-site enforcement personnel.
- 23) Designated restricted-use areas.

2.5 Comparison of Alternatives

As indicated in Chapter 1.0, and discussed earlier in this chapter (Section 2.2), issues raised, and concerns expressed, by the public, and state- and federal-agency personnel during the scoping portion of this EIS formed the basis for the development of the alternatives presented in this chapter. The purpose of this section is to compare the environmental consequences of the alternatives studied in detail, and to identify how the alternatives respond to the issues and concerns. Implementation of any of the alternatives, including the No Action, No Change, Alternative, will affect the physical, biological, cultural, social, and economic resources of Mt. Magazine. These effects are discussed in Chapter 4.0 (Environmental Consequences), and are summarized below. Table 2.3 compares environmental effects by alternative.

2.5.1 Soil, Water, and Air

With the exception of the differences in acres affected by construction and the direct effects of construction, there are few differences between the effects of the proposed development alternatives on soil, water, and air on Mt. Magazine. Construction of facilities, roads, and trails under the development alternatives would result in the disturbance of 13.6-20.9 acres (Alternatives B through E, respectively) of soil through clearing, grading, and compaction. Indirect effects of construction activities are the changes in drainage patterns, and runoff quantity and quality from grading, erosion, and sedimentation. Most of these indirect effects are expected to be temporary, minimal, and of little or no consequence, as the effects can be mitigated. Sediment loss due to changes in land use for all the alternatives is below threshold levels considered to be significant, and is not expected to have long-term, cumulative effects on surface water in the drainages off the Mountain. Restricted access to the west end of the Mountain will minimize the number of people exploring the slopes above rock faces which are currently undergoing slow rates of movement.

Table 2.3. Comparison of effects by alternative, Mt. Magazine EIS.

Effects	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)	Alternative E
SOIL, WATER, AND AIR					
Area affected during facility construction (acres)	NA	3.3	3.7	7.1	9.1
Area affected by road construction (acres)	NA	10.3	10.3	10.1	10.5
Area directly affected by trail construction (acres)	NA	0	0	1.3	1.3
Total area affected by construction (acres)	NA	13.6	14.0	18.5	20.9
Percent of total area affected by construction on the mountaintop	NA	0.6	0.6	0.8	0.9
Estimated daily wastewater flows (gpd)	NA	7,800	8,600	16,700	23,800
Ambient air quality	No Change	No Change	No Change	No Change	No Change

Table 2.3. Continued.

Effects	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)	Alternative E
PLANTS AND WILDLIFE					
Potential plant communities affected by construction ¹	NA	a, b, c, d, e	a, b, c, d, e	All	All
Maximum percent area of vegetation removed from mountaintop during construction	NA	0.6	0.6	0.8	0.9
Area subject to change in vegetation as a result of development (acres)	NA	59.1	60.5	59.5	71.5
Percent area subject to change in vegetation as a result of development	NA	2.7	2.8	2.7	3.3
Growth of vegetation promoted by WWTP discharge	NA	+	+	+	+
Danger of catastrophic fire	++	+	+	+	+
Potential vertebrate populations eliminated by construction	NA	0	0	0	0
Potential vertebrate populations eliminated as a result of development	NA	0	0	0	0

Table 2.3. Continued.

Effects	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)	Alternative E
PETS AND SPECIAL SPECIES					
No. plant species potentially affected by succession	3	0	0	0	0
No. plant species potentially affected by development	NA	4-6	4-6	8-10	8-10
No. vertebrate species potentially affected by development	NA	1	1	1	1
No. invertebrate species potentially affected by development	NA	0	0	0	0
Area potentially affected by use of new trails (acres)	NA	0	0	3.6	3.6
CULTURAL RESOURCES					
No. sites potentially eligible for nomination to the National Register ²	NA	6	7	12	12

Table 2.3. Continued.

Effects	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)	Alternative E
SOCIOECONOMICS					
Changes in gross sales (millions of dollars)					
• Short-term total effect ³	0	10.4	10.9	20.7	22.6
• Long-term total effect ⁴	0	6.5	7.5	10.0	12.6
Changes in employment (number of jobs)					
• Short-term total effect	0	82	87	141	179
• Long-term total effect	0	78	89	119	150
Changes in wages and salaries (millions of dollars)					
• Short-term total effect	0	2.3	2.4	3.9	5.1
• Long-term total effect	0	1.2	1.4	1.9	2.3
Total estimated yearly revenue ⁵ (thousands of dollars)	0	898	846	1,392	2,160
Estimated yearly net accounting profit ⁵ (thousands of dollars)	0	314	296	487	756

Table 2.3. Continued.

Effects	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)	Alternative E
Estimated annual visitation (thousands of visitors) ⁶					
• Low	43	130	201	227	331
• High	50	152	235	265	387
• Best	47	141	218	246	359
Projected first costs (millions of dollars)					
• Bear Hollow lodge site	NA	NA	8.44	13.39	17.43
• Old lodge site	NA	8.14	8.48	13.41	17.46
Projected annual O & M costs (thousands of dollars) ⁷	30	858	912	1,242	1,385
OPPORTUNITIES FOR PUBLIC USE					
Education opportunities	+	++	+++	++	++
Diversity in recreational opportunities	+	++	++	+++	++++
Hunter access points	4	2	2	2	2
Hunting on top of mountain	yes	no	no	no	no
Restricted-use area	no	yes	yes	yes	yes
AESTHETICS					
Controls on vandalism	+	+++	+++	+++	+++
Controls on trash disposal	+	+++	+++	+++	+++
Visual intrusions	+	++	++	++	++

Table 2.3. Continued.

Effects	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)	Alternative E
Area affected by changes in use (acres)	0	59	60-61	59-60	71-72.
Area affected by change in use (as percent total mountaintop area)	0	2.7	2.8	2.7	3.3

¹ a = Pine/pine hardwood;

b = Mesic oak;

c = Xeric oak;

d = Juniper/juniper hardwood;

e = Bluff lines.

² Sites that will be affected by development in the areas surveyed.

³ Associated with construction phase of project.

⁴ Associated with annual tourist-related expenditures.

⁵ Total yearly revenue and net accounting profit based on revenue-generating facilities only (e.g., lodge, cabins, and restaurant). O & M costs for nonrevenue-generating facilities not included in the revenue and profit estimates.

⁶ Estimates based on a comparison of historical total visitations to available lodging and composites of three state parks: DeGray, Petit Jean, and Queen Wilhelmina.

⁷ Estimates of O & M costs included infrastructure considerations, and are beyond those considerations included in the estimates for total yearly revenues and yearly net-accounting profit. See Appendices E, and F for methods used to derive these estimates.

Stormwater runoff from the affected areas would contribute an insignificant increase in flow to distant drainages, and would not degrade water quality in these drainages. Reduction in groundwater recharge will be less than one percent of the total area available for recharge for the development alternatives. Construction of the water line and storage facilities will provide a year-round supply of water on the Mountain.

The proposed toilets and wastewater treatment facility will improve human-waste disposal, and provide for the protection of both human health and water quality. Wastewater generated will be treated and released off the Mountain with no long-term cumulative, negative effects on flora and fauna.

The proposed development would not degrade ambient air quality, and dust raised during construction can be controlled through mitigation measures.

2.5.2 Vegetation

Under Alternative A, no new construction is planned; therefore, no direct effects of construction on vegetation will occur. Some degree of habitat destruction and loss of sensitive species from trampling, nonregulated collection of species, and soil compaction at Dripping Springs and at Brown Springs are expected to occur each year as a result of limited visitor control and regulation on the Mountain. Over time, these effects may be detrimental to the continued existence of these species on the Mountain. Indirect effects under Alternative A include the establishment of weedy species, and the replacement of natural vegetation with more weedy species, and the loss of certain plant species and communities through natural successional processes. The degree to which the effects under this alternative can be mitigated will be dependent on the funding available to the United States Forest Service budget for species, and habitat management and protection. Future funding, however, is unknown at this time.

On-site management and enforcement, restricted-use areas, educational and scientific research opportunities, and expanded species monitoring programs are provided by development Alternatives B, C, D, and E to protect the sensitive plant communities, habitats, and species that exist on the Mountain, but are limited or nonexistent under Alternative A. No readily-available fire protection and control measures are available on the Mountain, and United States Forest Service response time to a fire on Mt. Magazine to protect species and habitats under Alternative A is one hour. Under Alternatives B, C, D, and E, fire protection and control measures will be readily available, but equipment and personnel will be limited, and United States Forest Service support will still be needed to protect species and vegetation.

In contrast to Alternative A, approximately 13.6 acres of vegetation will be removed to construct new facilities on the Mountain under Alternative B. With the exception of the irretrievable loss of vegetation from clearing, no direct effects on the plant communities affected by construction activities are expected to occur. At the construction locations, with the exception of the old lodge site, no indirect effects from construction are expected to occur. At the old lodge site on the south side of the Mountain, species trampling, invasion of weedy species, and soil compaction may occur. These effects can be avoided or minimized through the implementation of species and habitat protection measures during construction. These practices are outlined in detail in Chapter 4.0.

Direct and indirect effects on the vegetation and sensitive plant species on Mt. Magazine under Alternative C will be similar to those under Alternative B. Approximately 14.0 acres of

vegetation will be cleared to construct new facilities, an increase of less than one-half acre over Alternative B. Increased opportunities for education and scientific research will provide information to the public on how to better facilitate the protection of botanical resources not provided under the other alternatives, and will provide more scientific data to monitor species and habitat changes over time.

Similar to Alternatives B and C, no adverse direct or indirect effects from construction of the visitor information center and the lodge facilities are expected to occur under Alternative D. Approximately 18.5 acres of vegetation will be removed for the construction of the state-park facilities under this alternative, including the construction of a new rim hiking trail and a 19th-century homestead. The permanent removal of an additional 4.5 acres of vegetative cover under this alternative, however, is not expected to have adverse effects on the plant communities or on the sensitive plant species on the Mountain. Only small portions of the respective communities where construction is proposed will be lost. While the proposed rim trail traverses a few plant communities, with limited distribution on the Mountain (e.g., scrub oak woodlands, and mesic bluff-line community), and the habitat of some sensitive species (e.g., Ozark chinquapin, prickly gooseberry), potential adverse effects are avoidable by rerouting the proposed trail away from these limited communities and sensitive species or habitats. Additionally, low-impact trail construction methods are available and will be employed.

Because an increase in year-round visitation is anticipated under Alternative D, effects on the vegetation in the area of the proposed old lodge site from increased foot traffic is expected to increase; however, these effects are expected to be manageable and offset by increasing pedestrian control, and species and habitat protection measures at this site.

Effects on the vegetation are expected to be greatest under Alternative E. Both the acreage affected by this alternative, and visitation and use of the Mountain will be the highest of the alternatives. Indirect effects associated with visitor use (i.e., trampling, soil compaction, and invasion and replacement by weedy species) will be the highest under Alternative E. An increase in mitigation measures will be necessary to minimize indirect effects on this community; however, it is unlikely that the effects can be completely eliminated. Cumulative effects of construction and increased visitor use of the old lodge site are expected to have unavoidable effects on the juniper-hardwood woodlands and on certain sensitive species that occur within this community type. Increased management and mitigation measures will be required to prevent irretrievable and irreversible effects on the juniper-hardwood woodlands, and the species associated with openings and rock outcrops of this community. No other effects are expected, however, as a result of increased visitation and use of other proposed recreational areas on the Mountain under this alternative.

2.5.3 Wildlife (Vertebrates)

No direct environmental consequences to the vertebrate community are anticipated as a result of the No Action, No Change, Alternative. However, indirect consequences resulting from limited control and regulation (e.g., fires) are greater than those for the development alternatives.

With all of the remaining alternatives, vertebrate species habitat will be irretrievably lost. The maximum proposed acreage directly affected by construction, however, represents less

than one percent of the plateau acreage. No cumulative or long-term environmental consequences to the general vertebrate population are expected to occur under Alternatives B, C, D, or E.

2.5.4 Wildlife (Invertebrates)

Alternative A, in general, will not produce direct effects on the invertebrate community of Mt. Magazine. Generally, the potential for direct effects from development under Alternatives B through E is restricted to removal of vegetation for construction activities. These actions would remove invertebrate populations and habitat, but the areas are limited in scope, and are small when compared to the total amount of invertebrate habitat available in the affected environment. Indirect effects on the invertebrates are likely to increase with increased use. However, these effects can be reduced and mitigated by implementation of specific restrictions and management practices.

Increased stormwater runoff from construction activities and overall changes in land use on the Mountain have been determined to be minimal in any specific drainage. Consequently, species assemblages of invertebrate communities should not be altered. Under Alternatives D, and E, increased flows, in either Big Shoal Creek drainage in Bear Hollow or into West Bass Creek on the south side of the Mountain from discharges from the wastewater treatment plant, may cause minor habitat alterations in the drainages. While the flows under Alternative E will be greater than those under Alternative D, there should be little differences between these alternatives. It is expected that neither of these alternatives will affect habitat or species composition of downstream areas, and that greatest effects will be seen on habitat in the middle reaches of the two drainages.

2.5.5 Proposed, Endangered, Threatened, and Sensitive (PETS) Species

2.5.5.1 Plants

Under Alternative A, the continued existence of most of the plant species of special concern will be promoted. There are three species, however, that have the potential of being lost through normal plant successional trends under the No Action, No Change, Alternative. Two of the species (Bush's poppy mallow, and small-headed pipewort) probably have already been lost through natural successional processes. The third species, soapwort gentian, has the potential to be shaded out of existence through development of a heavy canopy over its normal sunlit habitat.

Under Alternative B, the effects to PETS plant species would be minor. In the area of the proposed visitor center, minor effects on prickly gooseberry could occur because there are a few plants present at the site. This would be of little consequence, however, because the species is locally abundant at numerous other sites that will not be affected. Construction of the lodge, cabins, parking areas, and associated developments has the potential for loss of individuals of Ouachita leadplant and broom nailwort, and some habitat degradation. These potential effects can be minimized through establishment of buffer zones prior to construction. Control of visitor access after construction will be necessary to reduce or minimize other direct or indirect effects on these species.

Under Alternative C, no additional effects on PETS plant species beyond those described under Alternative B are expected to occur. An increase in species and habitat protection

measures will be necessary under Alternatives D, and E to balance the effects associated with increased visitor use. With these measures in place, some localized species losses, habitat degradation, and population size reductions are expected to occur in Alternative E in heavy traffic areas.

Under Alternatives D, and E, additional effects on PETS species could occur from the construction and use of the proposed rim trail. The rim trail has the potential to affect several PETS species in most reaches of the trail except at the rim of Bear Hollow and the quarry area (see Chapter 4.0). These potential effects can be minimized or avoided by rerouting the trail around these species, and by providing a protecting vegetative buffer between the species and the trail.

2.5.5.2 Wildlife (Vertebrates)

No direct or indirect environmental consequences to the PETS vertebrate species are anticipated as a result of the No Action, No Change, Alternative. However, benefits associated with habitat improvement, and monitoring recommended as mitigation in conjunction with the other development alternatives will not likely be afforded under this alternative. Under Alternatives B, and C, construction activities associated with the lodge, cabins, and associated structures at the old lodge site could result in direct effects to the rufous-crowned sparrow. Indirect effects resulting from increased visitation and human activities may also affect the sparrow population on Mt. Magazine. However, with adherence to the proposed mitigation measures (see Chapter 4.0), it is possible the net effect may be beneficial as a result of habitat enhancement and monitoring. There are no environmental consequences anticipated from construction of other structures, or indirect effects from use activities under this alternative. With the exception of increasing effects on the rufous-crowned sparrow, as a result of increased disturbance from construction and visitor use under Alternatives D, and E, no other increased effects on the vertebrate PETS species on the Mountain will occur.

2.5.5.3 (Wildlife) Invertebrates

Under all alternatives, the Magazine Mountain shagreen could be directly affected by habitat destruction if access to the talus slopes on the north face of the Mountain is not regulated. Indirect effects on the shagreen as a result of Alternative A are unlikely. Direct effects on the Diana fritillary as a result of unregulated over-collection could occur under Alternative A. Routine mowing of road corridors during flowering of this species' host plant could affect this butterfly under all alternatives; however, these effects can be avoided through changes in roadside maintenance scheduling. No other invertebrate PETS species are expected to be affected by any of the five alternatives. Alternatives B through E are beneficial for invertebrate PETS species by increasing awareness, and by providing additional scientific investigation and environmental monitoring.

2.5.6 Cultural Resources

Alternative A will produce no direct effects on the cultural resources of Mt. Magazine. Indirect effects on archeological and historical resources (i.e., vandalism and nonscientific collecting) would continue as a result of limited control and regulation of visitation under Alternative A. Likewise, Alternatives B through E would also indirectly affect cultural

resources as a result of increased accessibility by an increased number of visitors; however, under these alternatives there would be on-site monitoring and enforcement to protect the Mountain's cultural resources. Direct and indirect effects on cultural resources increase with the increasing level of development from Alternative B through Alternative E. Any ground-disturbing activities in the vicinity of sites considered significant and eligible for nomination to the National Register (e.g., Sion House Farmstead, Site 49-22; Brown Farm Complex, Site 49-27; and Benefield Farm, Site 3L094) must be mitigated through a comprehensive program of data recovery or excavation, and archival research. Significant sites are described in Chapter 4.0. The number of sites potentially eligible for nomination to the National Register is six to twelve for Alternatives B through E (Table 2.3).

Any proposed development outside the actual areas surveyed will need to be examined.

2.5.7 Socioeconomics

Under Alternative A, current socioeconomic trends should continue in the primary impact area. Low or no growth in population; a decrease in total real income, earnings, and labor force; and an increase in unemployment are expected.

Table 2.3 presents a summary of the total short-term and total long-term economic effects to the primary impact area for each of the four Mt. Magazine development alternatives (Alternatives B, C, D, and E). The estimated impacts upon gross sales, employment, and wages and salaries are presented separately. Short-term effects last only as long as the construction process, while the long-term effects are ongoing through time. For example, as noted in Table 2.3, the impact of Alternative B on gross sales is \$10.4 million in the short-term, but only \$6.5 million in the long-term. However, after the second year of tourism, the cumulative long-term effect is \$13.0 million, and \$19.5 million after the third year. The same analysis applies to employment impacts, and wages and salaries. The long-term economic impacts are probably a more meaningful measure of the different development alternatives associated with Mt. Magazine. For instance, the 119 jobs associated with Alternative D in the long-term represent continuing employment, while the 141 jobs associated with the construction cease to exist with completion of the project. These long-term values for gross sales, employment, and wages and salaries should prove helpful to decision makers concerned with the economic well-being of the affected area.

First cost commitments for the development alternatives, which include construction, architectural engineering, and planning costs, range from \$8,138,440 (Alternative B) to \$17,457,750 (Alternative E). These costs are expected to be phased in over a number of years, and will be provided by the State of Arkansas. Projected annual operation and maintenance costs range from \$30,000 (Alternative A) to \$1,384,570 (Alternative E).

Estimated yearly revenues range from \$898,000 to \$2,160,000, and estimated annual profits for the various levels of development range from \$314,000 to \$756,000.

2.5.8 Opportunities for Public Use

Use of the Mountain for rock climbing, hang gliding, hiking, horseback riding, camping, bird watching, and nondirected educational study will continue under Alternative A. This alternative will attract the visitor seeking a more solitary setting than is available at other

mountaintop parks. Safety hazards related to unstable cliff faces are monitored through unscheduled patrols by law enforcement officers, and are greatest under this alternative.

Alternatives B through E provide more educational opportunities, and offer a broader range of recreational opportunities. These alternatives make the Mountain appealing to a more diverse population, provide restricted-use areas to protect the Mountain's resources, and offer the user some safety benefits. The reduction of hunter access from four-two access points, with development on the Mountain, may inconvenience hunters but should not affect use of the slopes for hunting.

The maximum educational potential of Mt. Magazine is realized under Alternative C, with the addition of a teaching/research laboratory and library. The maximum recreational potential of the Mountain is realized under Alternative E, with the addition of a swimming pool, tennis courts, hiking trails, and 19th-century homestead.

The designation of restricted-use areas under the development alternatives should provide long-term beneficial effects to preserve the Mountain's resources. The regular presence of enforcement personnel should minimize use of unstable cliff faces, and reduce the hazards associated with these bluffs.

2.5.9 Aesthetics

Limited visitor control and regulation on the Mountain will continue to result in vandalism and improper trash disposal under Alternative A. Scenery, as viewed from the overlooks, will continue to draw visitors to the Mountain.

Improvements proposed under the development alternatives will change how the recreation areas look. Approximately 59.1 - 71.5 acres of land would be affected by a change in use (i.e., three percent of the mountaintop). Which of the alternatives, A (no development), or B, C, D, or E (development), is more aesthetically appealing is a matter of personal preference. The scenery, as viewed from the Mountain, will not significantly differ. The four development alternatives will offer monitoring and control of vandalism and trash disposal.

The location of the lodge under the development alternatives does affect the scenery, as viewed from the two alternative lodge sites. The old lodge site on the south rim offers a spectacular view of the valley below. The Bear Hollow site does not offer this view, but may appeal to the visitor who likes a more rustic setting.

3.0 THE AFFECTED ENVIRONMENT

3.1 An Overview of the Affected Environment

This section describes the Mt. Magazine area and the uses and conditions of its present and potential major resources. The summit of Mt. Magazine is approximately 2,200 acres in size; and of these 2,200 acres the proposed state park would directly affect less than 3 percent of the land on top of the Mountain. As part of the park proposal, approximately 865 acres would have restricted access.

3.2 Geology and Physiography

Mt. Magazine rises out of the Arkansas River Valley, which runs in an east-west direction and lies between the Boston Mountain range to the north and the Fourche Mountain range to the south. At its summit on Signal Hill, Mt. Magazine is 2,753 ft (Figure 3.1) above mean sea level, the highest point in Arkansas. Mt. Magazine is generally a flat-topped plateau rimmed by sheer rock bluffs and represents an erosional landform created when bedrock in the Arkoma Basin uplifted and eroded away to reveal thick sequences of Pennsylvanian sandstones and shales. There are no active faults in the area that would jeopardize the project. The U.S. Forest Service (USDA Forest Service 1979) provides additional descriptions of the geology of Mt. Magazine and the surrounding area.

The slopes of Mt. Magazine range from steep to precipitous, often breaking off into sheer cliffs on the southern and northern rims. The north side of the Mountain near the cliff edge is an area of active mass wasting as evidenced by soil creep, rock creep, and slides. Average rates of mass wasting are probably in the order of millimeters per year and are generally insignificant over a short period of time, that is, 50 to 100 yrs. Low sloping areas above the rock faces have well developed soils but lack plant growth; this observation suggests these are areas of surface movement of soil. Mt. Magazine's climate, altitude, relief, and rock characteristics combine to make the north cliff face very unstable. Below these cliff faces, the mountainsides are marked by alternating flat benches and steep slopes with rock streams.

Rock streams are extensively developed just below the upper cliffs on the Mountain. Rock streams are composed of unconsolidated cobble to boulder-sized rock fragments and are found on slopes free of trees and other vegetation. There are approximately 35 rock streams on the Mountain (Vere et al. 1982) with the largest and best developed on the north side. Most are located west of the Cameron Bluff overlook area. Rock streams are fairly unique geological features in Arkansas with the only other known rock streams occurring on Rich Mountain and Black Fork Mountain (Lookingbill et al. 1987), and a small one reported on Mt. Nebo. Active stream flow and groundwater seepage are always associated with rock streams. Surface runoff from the Mountain, which flows over the cliff, and seepage from the cliff face immediately above the rock streams, contribute to rock stream formation largely by sapping the cliff face and providing loosened rock fragments. These features are currently being monitored to determine how the cliff face and upper slopes have been developed and are changing (Vere, personal communication 1991).

The U.S. Forest Service (USDA Forest Service 1979) describes in detail the mineral resources managed by the U.S. Forest Service in the vicinity of Mt. Magazine. Oil and gas leases have been issued for all of the 2,200 acres on Mt. Magazine. These leases, however,



Figure 4.1. Location of proposed water line, access roads, and water tower.

contain special stipulations that deny surface use or occupancy. There has never been drilling activity for oil or gas on the Mountain top. With the exception of oil and gas leases, there are no significant mineral interests within the affected area on Mt. Magazine. There is an old quarry site on the east end of the Mountain top from which sandstone was removed many years ago and which is no longer quarried. Other quarries presently operate in the surrounding counties, and these quarries more than meet the demand for sandstone materials.

3.3 Soils

Soils are derived from the sedimentary sandstones and shales of the Savannah Formation. As described by the U.S. Forest Service (USDA Forest Service 1979), weathering of this bedrock has produced three basic types of soils on Mt. Magazine: residual loamy soils, residual clayey soils, and loamy soils formed by the weathering of colluvial material. The mountaintop within the affected area consists of fine, sandy loam of the Mountainburg and Linker series (USDA Soil Conservation Service 1980). These soils range from shallow on the hilltops and edges to moderately deep. They are moderately permeable to slowly permeable, fine to medium textured, well drained, and acidic; and they have a slight to moderate erosion hazard (USDA Forest Service 1979). Nella-Enders-Mountainburg soils are found on the side slopes. Clayey soils occur on the steep side slopes and along drainages, where deep stony soils are found on foot slopes and benches. These are areas with a high potential for mass movement. Erosion hazard for these soils increases with slope gradient. All areas where slopes exceed 20% are considered to have moderate to severe erosion hazard (USDA Forest Service 1979). There are no mapped hydric soils within the 2,200 acre affected area.

3.4 Climate

The average annual temperature on the summit of Mt. Magazine is 56°F, 6°F cooler than the average temperature at its base and the surrounding areas (EarthInfo 1990). The average temperature ranges from 36°F in January to 76°F in July. The midsummer summit temperature is frequently 10-15°F cooler than that of the surrounding valleys (USDA Forest Service 1979). Temperatures on the summit ranged from a high of 105°F to a low of -9°F during the period 1948-1966 (EarthInfo 1990). Due to Mt. Magazine's altitude and relief, winters on the top of the Mountain can be severe. Low temperatures in conjunction with strong winds create wind chills frequently below zero, and rime ice often coats the upper north slopes (Vere 1989).

Precipitation in the area is usually abundant and well distributed throughout the year, with an average of 92 days per year having measurable precipitation (USDA Forest Service 1979). The average annual precipitation on the summit is 54 inches. The average annual range of precipitation on the Mountain is 35.8-80.8 inches (Earth Info 1990). According to the U.S. Forest Service, the area has heavy fog on an average of 8.5 days per month (USDA Forest Service 1979). The months with the highest occurrences of fog are November (16 foggy days) and February (14 foggy days). March and April have the lowest occurrences of fog. There is currently no published data for average monthly wind speed and direction on Mt. Magazine.

3.5 Surface Water and Groundwater

The top of Mt. Magazine has very limited quantities of water available for use in further development of the area. Surface water resources are limited to two man-made ponds, described

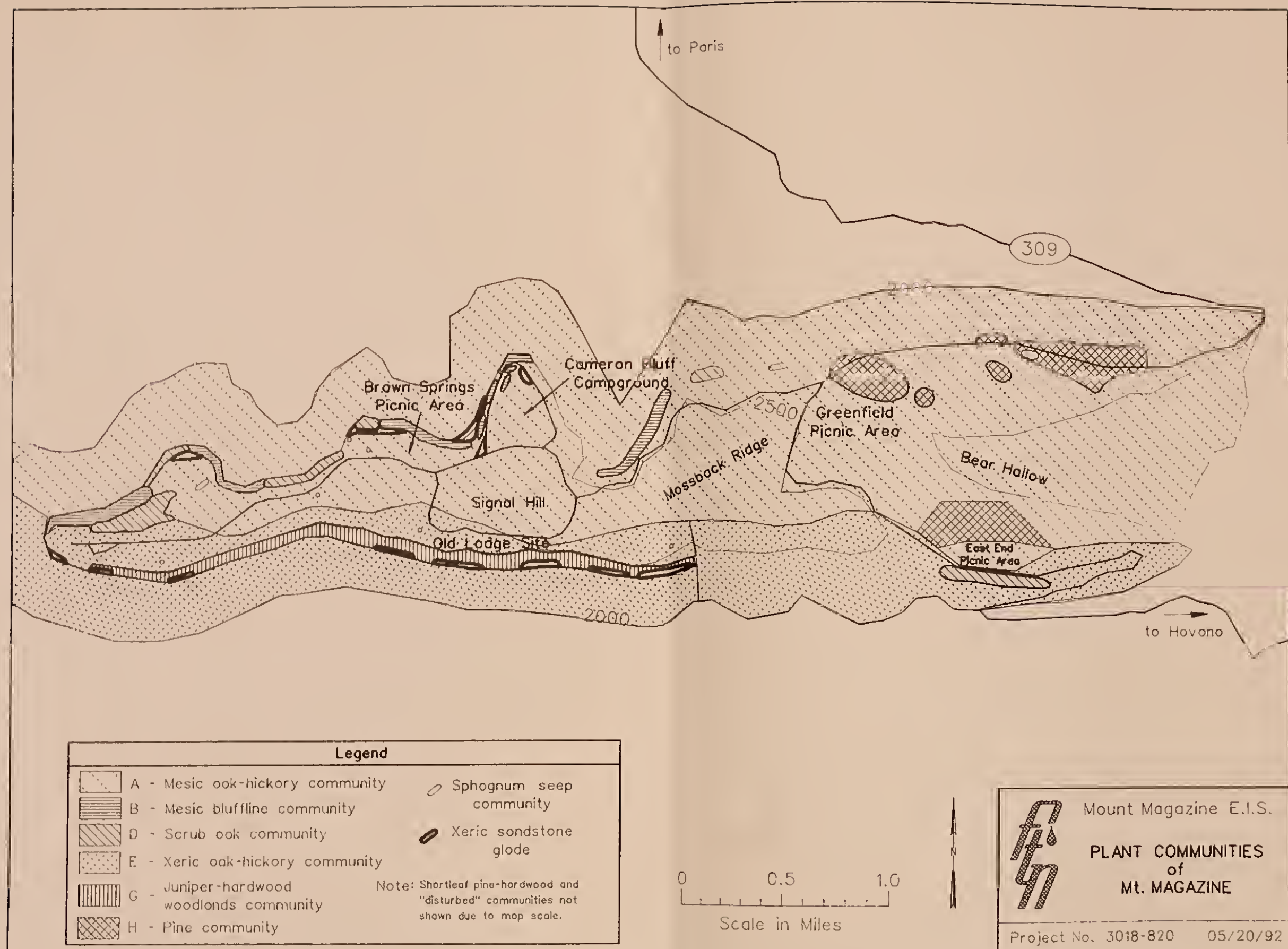


Figure 3.2. Plant communities of Mt. Magazine.

cultivation have been lumped into one community type, the disturbed plant community, for ease of description in this document. While each of the eleven plant communities described above have been disturbed to some degree by man and nature, the latter two communities exhibit distinct changes in species composition.

A brief summary of these communities, their distributions, and the dominant and notable features or species within these communities is provided in the following sections. Complete descriptions of the plant communities and their major botanical elements can be found in Appendix A. A list of plant species previously known to occur on the Mountain (Tucker 1972) and those observed during the 1991 field survey is provided in Appendix B.

3.6.1 The Mesic Oak-Hickory Community

The mesic oak-hickory forest is the dominant plant community on the top of Mt. Magazine. This community is found mainly on the north slope of the Mountain and in shaded, moist ravines; however, it extends across a broad moisture gradient on the Mountain (Figure 3.2). This community is at its best development on the upper, shaded, north-facing slopes and in protected drainages. In these areas, species diversity is high and soils are moist for the majority of the year. Two of the best examples of this community type can be seen on the north-facing and northeast-facing slopes of Mossback Ridge where species richness and diversity is high (Tucker 1990a). On lower slopes and somewhat drier aspects, the flora of this community is less diverse.

The dominant overstory tree species of this plant community include, white oak (*Quercus alba*), northern red oak (*Q. rubra*), and several hickory species (*Carya glabra*, *C. ovata*, and *C. cordiformis*). Many other forest canopy and understory species occur within this community and are presented in Appendix A. Yellow wood (*Cladrastis kentukea*) can also be found in those protected areas described above with higher species diversity (Tucker 1990a). Typical shrub species found in this community include spicebush (*Lindera benzoin*), prickly gooseberry (*Ribes cynosbati*), and devil's walking stick (*Aralia spinosa*). Other shrubs commonly present in this plant community type are also described in Appendix A. The herbaceous plants found within this community are extremely diverse and also include several species of concern and a state rare species.

On the upper slopes on the north side of the Mountain, the mesic oak-hickory forest community abuts areas of talus slopes and rock streams. In these areas there is considerable seepage contributing to the formation of populations of prickly gooseberry, hydrangea (*Hydrangea arborescens*), and other species. The Rocky Mountain woodsia (*Woodsia scopulina* var. *appalachiana*) may also be locally abundant in these areas (Tucker 1990a).

3.6.2 The Xeric Oak-Hickory Community

The xeric oak-hickory forest community is the second largest plant community in terms of its areal distribution on the plateau of Mt. Magazine. It is extensive on the south side of the Mountain, particularly on the steep upper slopes above 2,000 ft elevation. The overstory of this community is dominated by post oak (*Q. stellata*) and/or blackjack oak (*Q. marilandica*) of normal size in contrast to those found in the scrub oak woodlands described below. Other tree and shrub species found scattered or locally abundant within this community are listed in Appendix A. Herbaceous cover in this community is sparse and species diversity low (Tucker

1990a). Signs of both man-made and natural disturbances are evident on the bluffs, ledges, and openings of this community. In these areas, a number of advantageous, showy, herbaceous species in the Asteraceae, Fabaceae, and Poaceae families can be found.

3.6.3 Mesic Bluffline Community

Tucker (1990a) separates this community from the mesic oak-hickory forest on the basis of its location on the outcroppings of the bluffline on the north side of the Mountain and not on the basis of floristic elements. This bluffline community integrates with the mesic oak-hickory forest described previously and the xeric sandstone glade community described below. Its overstory composition is similar to the mesic oak-hickory forest, but differs from it in having a high cover of shrub and understory tree species. Two notable features of this community are: (1) it is the type habitat for the maple-leaf oak (*Q. shumardii* var. *acerifolia*), which has been proposed for being raised to the species level (*Q. acerifolia*) by Hess and Stoyanoff in 1990; and (2) it contains moist rock outcrops supporting a distinct and highly diverse community of ferns, a number of which are of special concern.

3.6.4 Juniper-Hardwood Woodland Community

The juniper-hardwood woodlands are found on the south rim of the Mountain at elevations between 2,400 and 2,550 ft. This community exists in a narrow and fragmented band along the south rimline (Figure 3.2) and often includes or is associated with several other plant community types. Some of these inclusions are: dry grass-dominated openings that are often devoid of shrubs and contain scattered trees; or wet sphagnum seep communities where there is enough moisture. In other areas this community is broken by patches of scrub oak woodlands community described below. Overstory vegetation of this community is dominated by eastern red cedar (*Juniperus virginiana*). Other dominant elements may include gnarled and/or stunted post oak and blackjack oak. Appendix A presents the dominant plant species of this and its associated communities. This community is notable as habitat for the rufous-crowned sparrow (*Aimophila ruficeps*), a species of special concern, and in some locations, as habitat for the western wallflower (*Erysimum capitatum*), also of special concern.

3.6.5 Scrub Oak Woodland Community

The scrub oak woodland community is found around the rim of the mountaintop on sandstone pavement rock outcrops with thin soil development (Figure 3.2). Some of the best examples of this community can be found on the north rim of the Mountain. In this community, stunted oak woodlands dominated by either blackjack oak or post oak or a combination of these two species, form nearly impenetrable thickets of heavily fruiting trees that are no more than 8-10 ft high (Tucker 1990a).

3.6.6 Sphagnum Seep Community

The sphagnum seep community is found in small seepage areas usually where there is seepage across a sandstone pavement outcrop or where shallow spring-fed streams flow across rock bottom rivulets (Tucker 1990a). This community occurs in a limited number of areas on the mountaintop and is distributed in a discontinuous pattern around the rimline. The largest example of this community in the affected area occurs at the edge of an old field on the east end

of the Mountain just north of a pine plantation (Figure 3.2). Peatmosses (*Sphagnum* sp.) are the dominant plants of this community. Associated with the peatmosses are a number of other plant species tolerant of wet or moist conditions including species from the genera *Juncus*, *Carex*, and *Rhynchospora*, and several grass genera. In some areas of the Mountain, more showy flowering plants also occur in this community. This community is notable as habitat for the small-headed pipewort (*Eriocaulon kornickianum*), currently being studied for federal listing. This species has been described as occurring in this community type and has been collected previously from this community type on Mt. Magazine. It has not been seen on the mountaintop for several years, however, and its absence may possibly be attributed to loss of suitable habitat as a result of forest succession and shading, not to human extirpation (Tucker, personal communication, 1990b).

3.6.7 Xeric Sandstone Glade Community

The xeric sandstone glade community usually occurs in association with the juniper-hardwood woodlands along the southern rim of the mountaintop, but may also be found on the north rim in areas in which the forest canopy is absent. Its most notable feature is its lack of trees and its sparse herbaceous cover. Two species of special concern, broom nailwort (*Paronychia virginica* var. *scoparia*) and Ouachita leadplant (*Amorpha ouachitensis*), proposed for federal listing, are often found within this community or in transition zones between this and other community types.

3.6.8 Shortleaf Pine-Hardwood Forest Community

This community is found on the south and north slopes of the Mountain as a transitional community between the shortleaf pine (*Pinus echinata*) dominated community found below the 1,600 ft elevation and the xeric oak hickory woodland community above 2,000 ft. Where the community occurs between these two elevations, its composition is transitional between these two community types with an overstory dominated by shortleaf pine and several oak and hickory species similar to those of the xeric oak-hickory community. Its herbaceous strata is similar in composition to the xeric oak-hickory community. The shortleaf pine-hardwood forest community is low in species diversity in all vegetative strata (Tucker 1990a).

3.6.9 Pine Community

Shortleaf pine communities were established, for the most part, on the lower flanks of the Mountain (Tucker 1990a). Remnants of a few of these former pine communities, however, can also be found above the 2,500 ft elevation on Mt. Magazine. Three of these areas on the Mountain were established approximately 49 years ago (USDA Forest Service 1992) and have been selected as preferred development sites on the Mountain. Little understory vegetation and herbaceous cover exists in these communities due to the dense shading and deep layers of pine needle litter on the forest floor. Associated species show varying degrees of similarity to the shortleaf pine forest and to the xeric oak-hickory woodland communities, depending on the age of the pine community and the management regime to which it has been subjected (Tucker 1990a).

3.6.10 Disturbed Communities

While each of the 11 plant communities on the Mountain have been disturbed to some degree by man and nature, a number of communities exhibit distinct changes in species composition. These communities are described in this section.

As a result of past disturbances and current use of the Mountain, several areas on the mountaintop are dominated by a number of weedy, invasive, non-native, or cultivated species. These communities are found predominantly in the recreation and picnic areas, the old lodge site, a few cabin sites, the northeast quarry area, and in the clearings surrounding the overlooks. These areas receive a seasonal regime of day use and maintenance (i.e., mowing). Other locations of this community type are old farm sites and homesteads. Several species of fruit trees and ornamental plants can be found in thickets at many of these sites. On occasion, escapes of the cultivated fruit trees are noted along existing roads and drainages on the Mountain.

3.7 Wetlands

There are several very small areas of wetland vegetation located on top of Mt. Magazine. Almost all are seasonal wetlands. Two sphagnum seep habitats are located west of Brown Springs outside the area of proposed development. One is located at the former but now-abandoned Dripping Springs Recreation Area and the other is adjacent to the unpaved road on a stretch between Brown Springs and Dripping Springs. Each is less than 0.1 acre in extent but of relatively good quality.

Another small wetland area, maintained by seasonal seepage flow in wet periods, is located at the head of the first major ravine to the west of the historic lodge site. This wetland is less than 0.05 acre in extent. Another wetland of a near permanent nature is located to the south of Highway 309 at a point east of Greenfield Recreation Area. This depressional site technically is a wetland and while supporting a small amount of sphagnum has been highly disturbed in the past. It is less than 0.05 acre in extent and is of poor quality. With the exception of the small area west of the historical lodge site, each of these wetland areas is located at major distances from proposed development activities. All will be avoided with relation to any potential impacts from park development.

Two additional wetlands exist within the project area, only one of which will be located near proposed developments. A small wildlife pond at the southeast base of Mossback Ridge is of good quality and is outside of any proposed park developments. At the base of Mt. Magazine within the existing powerline corridor is a wetland that has been disturbed previously by the construction of the powerlines. Less than one acre of this wetland will be disturbed for the construction of the waterline.

3.8 Wildlife

3.8.1 Vertebrates

The plateau of Mt. Magazine is home to many wildlife species. This ecosystem supports a wide variety of species which have adapted to the harsh dry summer conditions of the south slopes and the extreme winter typical of the north-facing exposures. Currently, the U.S. Forest Service provides some habitat management for game and non-game wildlife on the plateau. The

Arkansas Game and Fish Commission is responsible for establishing hunting and fishing regulations and law enforcement.

Large game species which inhabit Mt. Magazine include black bear (*Ursus americanus*) and the white-tailed deer (*Odocoileus virginianus*). Other game species typically encountered in various areas include gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), and the eastern cotton-tailed rabbit (*Sylvilagus floridanus*). Other game species not typically encountered, but which are likely to inhabit the plateau, include opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), grey fox (*Urocyon cinereoargenteus*), and coyote (*Canis latrans*). In addition to these game and fur-bearing species, numerous species of rodents, ground squirrels, chipmunks, and bats are also likely to inhabit the plateau of Mt. Magazine.

The diversity of the vertebrate community is determined by the habitat and its ability to provide cover and food requirements for the individual species of the vertebrate community. A qualitative evaluation of those areas proposed for development under any alternative is provided in Appendix C: Part I. The diversity, hence the quality of existing vertebrate habitat that currently exists on the Mountain varies from site to site.

To date, over 100 avian species have been identified from Mt. Magazine as recorded by the Arkansas Audubon Society (Max Parker, personal communication 1991) (Appendix C: Part II). This includes three game species: eastern wild turkey (*Meliagris gallopavo*), northern bobwhite quail (*Colinus virginianus*), and eastern mourning dove (*Zevaida macroura*). In Baerg's (1927) account of the summer birds on Mt. Magazine, 48 species were identified along with anecdotal notes regarding location and relative abundance. Although Mt. Magazine provides some unique species assemblages, it is noted by birding enthusiasts primarily as the location of the rufous-crowned sparrow, which until recently was the southeastern-most extension of its known range (see Section 3.9.3 for additional discussion of this species).

Many other species of amphibians and reptiles can be found within the affected environment on Mt. Magazine. Although far from complete, the Arkansas Herpetological Society has begun developing a list of known herpetofauna of Mt. Magazine. A list of known amphibians and reptiles identified from Mt. Magazine is included in Appendix C: Part III.

The limited aquatic habitats of the Mt. Magazine plateau directly support several species of fish, reptiles, amphibians, and aquatic insects, and indirectly support other reptiles, birds, and wildlife. There are two basic types of aquatic habitat types: ephemeral streams and ponds. Each supports different community assemblages.

The ephemeral streams that result from spring discharge and stormwater runoff, especially those flowing to the south, support vertebrates on a temporary basis. During the spring and early summer 1991, several species of amphibians and reptiles were observed directly in, or associated with, these water bodies. Although critical as a water source for the vertebrate community, these intermittent water bodies are even more important to aquatic insects and other aquatic invertebrates.

The only area of permanent standing water on the plateau within the locations proposed for development is a quarry pond located on the northeast wing of the Mountain. Field observations in 1991 indicated the presence of a variety of sunfish and minnows in the pond. This includes green sunfish (*Lepomis cyanellus*), bluegill sunfish (*L. macrochirus*), longear sunfish (*L. megalotis*), and largemouth bass (*Micropterus salmoides*). Several species of forage fish (i.e., minnows and topminnows) were also observed. Evidence exists to indicate the pond

has been utilized as a recreational fishery. All indications support the likelihood that the pond could be managed to provide a limited recreational fishery, limited primarily by its small size.

Although not within the areas specifically identified as development areas, several smaller ponds support the vertebrate community in a more indirect manner. The quarry pond on the southeast wing of the plateau supports a wide variety of fish species, including bluegill sunfish, longear sunfish, and several species of forage fish (i.e., minnows). The smaller ponds (wildlife pools) were not found to support a fish community, but large populations of aquatic life stages as well as adult amphibians were common in these impoundments.

Three management indicator species were chosen initially to evaluate the probable overall effects of the various proposed alternatives. The black bear was chosen due to concerns regarding the probability of black bear confrontation with the recreational user and the high quality of bear habitat which exists on the Mountain's slopes. In addition, the white-tailed deer and the eastern wild turkey were chosen to cover the range of response to increased human activity. The effects of the proposed alternatives were generally evaluated through comparisons of food and habitat requirements, and the likelihood of response to proposed activities.

Black Bear

The black bear (*Ursus americanus*) ranges over a large portion of Arkansas and its comeback from near extirpation in the State is well documented (Sealander and Heidt 1990). The Mt. Magazine area has been utilized in the past as a deposition area for "nuisance" bears (Joe Clark, personal communication 1991). As a result, Mt. Magazine has been the location of several documented user/bear confrontations. The U.S. Forest Service has undertaken a directed information and education effort to inform the current user community of the possibility of a bear encounter. However, even with these actions, nuisance encounters continue to exist. According to Dr. Clark, Arkansas Game and Fish Commission (personal communication 1991), the bear density on Mt. Magazine appears to be relatively low despite the high quality of bear habitat which exists on the plateau and slopes of Mt. Magazine. Results from bait station surveys conducted on the northern slopes of Mt. Magazine indicate an estimated density of less than one bear per six square miles.

White-tailed Deer

The white-tailed deer (*Odocoileus virginianus*) is generally considered an indicator species and was used in the evaluation of effects resulting from various alternative actions. Although a population exists on the plateau, the lack of available water acts to limit that population. Deer can survive without surface water for some time if rainfall, humidity and plant succulence are relatively high. However, according to the habitat suitability indices developed for the white-tailed deer, "free water" should occur within approximately 1 mile of a 99 acre habitat block for that habitat to be useful for the white-tailed deer (Short 1986). The limited presence of "free water" during the summer and lack of forage species during the winter are the likely key limiting factors to the Mt. Magazine white-tailed deer population on the plateau.

Eastern Wild Turkey

The eastern wild turkey (*Meleagris gallopavo sylvestris*) is present in the areas considered within the various alternatives. The habitat suitability index model developed for the eastern

wild turkey indicated a low tolerance to continuous and varied human activities (Davis 1976). Areas around campgrounds were avoided by foraging turkeys in Kentucky (Wright and Speake 1975). However, the degree of intolerance depends largely on disturbance level and hunting pressure (Wright and Speake 1975). Turkey populations which are not hunted tend to be more tolerant of human disturbance than those hunted (Bailey and Rinnell 1968).

3.8.1.1 Elimination of Management Indicator Species from Further Study

The proposed project is not likely to exert pressure on the black bear population of Arkansas or Mt. Magazine; therefore, no further analysis for this species was needed.

Under the various alternatives, white-tailed deer habitat to be eliminated ranges from 13.6 to 21 acres. The maximum removed is less than one minimum habitat area for the white-tailed deer, as defined in the habitat suitability index model (Short 1986). Under the various alternatives it is unlikely any of the proposed alternatives will result in significant modifications to the hydrology or the overall habitat to result in a change in the white-tailed deer population; therefore, no additional evaluation of this species was included in this document.

Although some eastern wild turkey habitat will be eliminated, the maximum amount of habitat proposed for removal is a small portion of the total available habitat (1.3% of the plateau). It is unlikely direct effects of a project of this magnitude (even with maximum proposed development) will be sufficient to eliminate the eastern wild turkey population from the plateau of Mt. Magazine. The variation in indirect effects between alternatives, resulting from increased human activities, progresses from Alternative A through Alternative E. Alternative B through Alternative E would eliminate hunting pressure which currently exists. The resulting net effect (i.e., increased human activity coupled with the elimination of hunting pressure on the plateau) is unlikely to affect the existence of the turkey population on the plateau; therefore, no additional evaluation was necessary.

3.8.2 Invertebrates

Few articles are available concerning the invertebrates of Mt. Magazine. One of the earliest articles is that by Pilsbry and Ferris (1906) in which the Mt. Magazine supercoil (*Paravitrea aulacogyra*) was described. Hubricht (1972) made general collections of snail fauna on Mt. Magazine and definitions of land snails in the eastern United States in 1985 (Hubricht 1985). Caldwell (1986) reported on the status of the Magazine Mountain shagreen (*Mesodon magazinensis*), a terrestrial snail described in the 1906 publication of Pilsbry and Ferris.

Mackin and Hubricht (1938) reported on isopods of the central and southern United States and Hubricht and Mackin (1949) subsequently described *Lirceus bicuspidatus* from Johnson County, Arkansas and reported its occurrence on Mt. Magazine. Holsinger (1967) described an amphipod, *Stygobromus elatus*, from a seep 0.2 miles east of the former lodge on Mt. Magazine. Dr. Holsinger questioned the validity of this species in a letter dated 11 April 1991 to Paul Hartfield of the U.S. Fish and Wildlife Service (see Appendix D).

Barr (1974) described the insect *Arianops sandersoni* from material collected from Mt. Magazine in 1949 by M.W. Sanderson. By far the greatest amount of invertebrate data and collections has come through the fieldwork of Dr. Robert T. Allen, formerly of the University of Arkansas, and currently Chairman of the Department of Entomology and Applied Ecology, University of Delaware, and his students.

Allen and Carlton (1987) reported on the status of two apparently endemic beetles. An arthropod survey of the east and south slopes of Mt. Magazine was reported by Allen (1989). Allen (1990) reported on insect endemism in the Interior Highlands of North America. Mt. Magazine is the type locality for several arthropod taxa (Allen in press; Allen and Carlton 1988; Mathis and Bowles 1989; Robotham and Allen 1988). Allen and Brown (1991) published a checklist of the Macrolepidoptera (large moths) of Mt. Magazine in which they reported 274 species. An arthropod species list is scheduled for publication in the Arkansas Academy of Science in 1993 (Tom Allen, personal communication 1992).

Finally, Dr. Allen has initiated an Inventory Newsletter of Mt. Magazine (Allen 1991a, 1991b), the second volume of which has an arthropod listing for Mt. Magazine (Appendix D). This list represents 121 species of insects within 3 families, and 53 species of spiders within 11 families. Authorities for these lists were Patricia R. Miller, Department of Biology, University of Mississippi (spiders); Lee Herman, Entomology Department, American Museum of Natural History (Staphylinidae); and Terry Schiefer, Department of Entomology, Mississippi State University (Cerambycidae and Disteniidae). Invertebrate community information has not been published. Areas of prime invertebrate habitat (Mossback Ridge and Bear Hollow) identified or published by Dr. Allen are outside the potential development areas.

3.9 Proposed, Endangered, Threatened and Sensitive (PETS) Species

3.9.1 Introduction

Federally listed threatened and endangered species are important for consideration in this EIS because these species are afforded protection from adverse effects under the Endangered Species Act (1973) as amended. Those species considered as sensitive by the U.S. Forest Service and as State "special plants or animals" discussed in this section are also noteworthy for study in this EIS because their protection is advised by the Ozark-St. Francis National Forests and by the Arkansas Natural Heritage Commission, respectively. By identifying these species and their habitats on the Mountain, the potential effects of each alternative on the continued survival or on the recovery of these species can be evaluated in Chapter 4.0. For those species in which adverse effects are unavoidable or for which effects will be irretrievable or irreversible, this information will form the basis for the recommended mitigation, recovery, and protection measures.

The information in this chapter has been compiled primarily from information provided by the Ozark-St. Francis National Forests. This list includes not only those species listed by the U.S. Fish and Wildlife Service under the Endangered Species Act, but also those species that the U.S. Forest Service considers to be sensitive in the Ozark-St. Francis National Forests. Other listings of the State's special plants and animals were utilized to ensure all possible taxa considered as "sensitive" species to Arkansas would be evaluated. Presented in this section is the status of these species as of January 1992 when the DEIS was written. With continued inventory and study of the Mountain, additional PETS species may be identified.

3.9.2 Plants

Federal Status

No plant species on Mt. Magazine are currently federally listed as threatened or endangered, and none has been proposed for listing in the Federal Register. Seven plant species,

however, are currently being studied or have been assessed by the U.S. Fish and Wildlife Service for possible further listing proposals. These seven species and their status are presented in Table 3.1.

U.S. Forest Service and State Status

The Southern Region of the U.S. Forest Service, the administrative unit including the Ozark-St. Francis National Forests, has developed its PETS program for the conservation of PETS species on the National Forests in the region. The current PETS list in use in the Ozark-St. Francis National Forests was formulated in 1989 and will be revised in the very near future. Fifty-one (51) plant species are included on the list, the large proportion of which are in the sensitive category (Table 3.2). These sensitive species are not subject to and have no protection under the provisions of the Endangered Species Act. Of the 51 species on the PETS list, 19 are known from the top of Mt. Magazine (Tucker, 1990a). General management guidelines and directions for the conservation of special status plants (and animals) are provided by the U.S. Forest Service Manual, Section 2670 (USDA Forest Service, 1989f). Additionally, the Ozark-St. Francis National Forests have written and implemented individual management guidelines for some of the species on the list.

The Arkansas Natural Heritage Commission is the designated state agency having authority to maintain a list of plant species of concern. The current list, referred to as the State Inventory List, is dated 11 December 1991 and includes approximately 400 species. These species are considered sufficiently rare by the Arkansas Natural Heritage Commission to merit tracking an occurrence in a computerized database. Twenty-two (22) species on the list are known from Mt. Magazine (Table 3.3). Most of these species are also found on the U.S. Forest Service PETS list.

A brief description of the PETS and special species currently known from Mt. Magazine and their habitat is provided in the following section. Specific locations of these species are not provided in this EIS to protect these species and their habitats from adverse effects.

- *Amorpha ouachitensis* - Ouachita leadplant
This species is known from several locations on Mt. Magazine (Tucker 1990a; ANHC 1990). Ouachita leadplant is a regional endemic that is found elsewhere in Arkansas and Oklahoma. Although it has been published as a C1 species by the U.S. Fish and Wildlife Service, in the upcoming listings to be published in May or June 1992 that agency will publish it as a C2 species (Cary Norquist, personal communication 1992).
- *Callirhoe papaver* var. *Bushii* - Bush's poppy mallow
This plant is a regional endemic that is known from Missouri, Oklahoma, and Arkansas. The U.S. Fish and Wildlife Service once treated it as a C2 species but reduced it to 3C3 status after determining it did not merit federal listing. Historically, it once grew in the vicinity of the old Buckman Inn but has not been found on the Mountain for many years.
- *Camassia angusta* - Wild hyacinth
The range has been described as "Illinois to Missouri, south to Kansas, Oklahoma, and Texas" (Steyermark 1963), but little is known of its Arkansas

Table 3.1. Status of plant species on Mt. Magazine being studied for possible federal listing.*

Taxa	Common Name	Status
Fabaceae		
<i>Amorpha ouachitensis</i>	Ouachita leadplant	C2
Fagaceae		
<i>Castanea pumila</i> var. <i>ozarkensis</i>	Ozark chinquapin	C1
<i>Quercus shumardii</i> var. <i>acerifolia</i>	Maple-leaf oak	C2
Eriocaulaceae		
<i>Eriocaulon kornickianum</i>	Small-headed pipewort	C2
Commelinaceae		
<i>Tradescantia ozarkana</i>	Ozark spiderwort	C2
Liliaceae		
<i>Veratrum woodii</i>	Wood's false hellebore	C3C
Malvaceae		
<i>Callirhoe papaver</i> var. <i>Bushii</i>	Bush's poppy mallow	C3C

- C1: Taxa for which substantial information is available on hand to support the biological appropriateness of proposing a listing to threatened or endangered status, but whose listing has been precluded from being listed because of listing activities of other species.
- C2: Taxa for which information is on hand and is possibly appropriate for listing as threatened or endangered, but conclusive data on the species' vulnerability and threat are not available to support listing. Additional information is needed to ascertain status.
- C3C: Taxa that were once considered for listing but were dropped. Taxa are now considered to be more abundant, widespread or substantially less subject to identifiable threat than was previously thought.

*Note: These species are not afforded protection under the Endangered Species Act.

Table 3.2. List of U.S. Forest Service PETS plant species known from Mt. Magazine.

Species	Common Name	U.S. Forest Service Status ²
<i>Amorpha ouachitensis</i>	Ouachita leadplant	Sensitive
<i>Callirhoe papaver</i> var. <i>Bushii</i> ³	Bush's poppy mallow	Sensitive
<i>Carex communis</i> ⁴	Fibrous-root sedge	Sensitive
<i>Carex pennsylvanica</i>	Pennsylvania sedge	Sensitive
<i>Castanea pumila</i> var. <i>ozarkensis</i>	Ozark chinquapin	Sensitive
<i>Dennstaedtia punctilobula</i>	Eastern hay-scented fern	Sensitive
<i>Dryopteris spinulosa</i>	Spinulose wood fern	Sensitive
<i>Eriocaulon kornickianum</i> ³	Small-headed pipewort	Sensitive
<i>Erysimum capitatum</i>	Western wallflower	Sensitive
<i>Gentiana saponaria</i>	Soapwort gentian	Sensitive
<i>Lilium superbum</i>	Broom nailwort	Sensitive
<i>Paronychia virginica</i> var. <i>scoparia</i>		Sensitive
<i>Quercus shumardii</i> var. <i>acerifolia</i>	Maple-leaf oak	Sensitive
<i>Ribes cynosbati</i>	Prickly gooseberry	Sensitive
<i>Sedum ternatum</i>	Wood stonecrop	Sensitive
<i>Stachys eplingii</i>	Epling's wood nettle	Sensitive
<i>Tradescantia ozarkana</i>	Ozark spiderwort	Sensitive
<i>Veratrum woodii</i>	Wood's false hellebore	Sensitive
<i>Woodsia scopulina</i> var. <i>appalachiana</i>	Rocky mountain woodsia	Deleted

1. Sources: Current Ozark-St. Francis National Forests PETS Lists, dated May 26, 1989.
2. Forest Service PETS list status categories include:

P = Proposed for federal listing as either Endangered or Threatened by U.S. Fish and Wildlife Service.

E = Listed by U.S. Fish and Wildlife Service as Endangered.

T = Listed by U.S. Fish and Wildlife Service as Threatened.

S = Sensitive (any species on the list having no U.S. Fish and Wildlife Service - initiated federal status).
3. Species not now known to grow on Mt. Magazine but for which known historical locations are known (apparently extirpated through natural plant succession).
4. Species for which historical occurrences on Mt. Magazine are known but the actual locations on the Mountain are unknown.

Table 3.3. List of plant species of State concern occurring on Mt. Magazine.

Species	Common Name	State Ranking ¹	State Status ¹
<i>Amorpha ouachitensis</i>	Ouachita leadplant	S3	--
<i>Callirhoe papaver</i> var. <i>Bushii</i>	Bush's poppy mallow	S3	--
<i>Camassia angusta</i>	A wild hyacinth	S2-S3	--
<i>Carex communis</i>	Fibrous-root sedge	S2.2	--
<i>Carex pennsylvanica</i>	Pennsylvania sedge	S2-S3	--
<i>Castanea pumila</i> var. <i>ozarkensis</i>	Ozark chinquapin	S3-S4	--
<i>Caulophyllum thalictroides</i>	Blue cohosh	S2-S3	--
<i>Dennstaedtia punctilobula</i>	Eastern hay-scented fern	S1-S2.2	--
<i>Deschampsia flexuosa</i>	Crinkled hairgrass	S2-S3	--
<i>Dryopteris spinulosa</i>	Spinulose wood fern	S1.2	Threatened
<i>Eriocaulon kornickianum</i>	Small-headed pipewort	S1-S2	Endangered
<i>Erysimum capitatum</i>	Western wallflower	S2.2	--
<i>Gentiana saponaria</i>	Soapwort gentian	S2	--
<i>Lilium superbum</i>	Turks-cap lily	S1.2	--
<i>Paronychia virginica</i> var. <i>scoparia</i>	Broom nailwort	S2.2	--
<i>Quercus shumardii</i> var. <i>acerifolia</i>	Maple-leaf oak	S1	Threatened
<i>Ribes cynosbati</i>	Prickly gooseberry	S2-S3	--
<i>Sedum ternatum</i>	Wood stonecrop	S3	--
<i>Stachys eplingii</i>	Epling's wood nettle	S2.1	--
<i>Tradescantia ozarkana</i>	Ozark spiderwort	S3	--
<i>Veratrum woodii</i>	Wood's false hellebore	S3	--
<i>Woodsia scopulina</i> var. <i>appalachiana</i>	Rocky mountain woodsia	S1.1	--

- State ranking and State status information obtained from Arkansas Natural Heritage Commission, Little Rock (State Inventory List dated 11 December 1991).
S1 = Extremely rare.
S2 = Very rare.
S3 = Rare to uncommon.
S4 = Common.
.1, .2, .3 = A single decimal digit after a State rank may be used as a finer subdivision to further clarify a rank.

status. The Arkansas Natural Heritage Commission currently tracks its occurrences. The relationship of this relatively obscure species to the well-known *C. scilloides* is problematic. On Mt. Magazine plants referable to the species have been seen on open roadsides along Forest Development Road 1606.

- *Carex communis* - Fibrous-root sedge
This sedge is a "northern" species with its primary center of distribution in the northeastern United States. The few known Arkansas localities are at the periphery of its range. Its typical habitat is rich, moist, heavily shaded forest soils. It was collected many years ago on Mt. Magazine but the exact locality is not known.
- *Carex pennsylvanica* - Pennsylvania sedge
This is another of the numerous "northern" plant species on Mt. Magazine. This species is found on the northwestern slopes and ridges of Mt. Magazine, typically in the mesic oak-hickory forest community.
- *Castanea pumila* var. *ozarkensis* - Ozark chinquapin
This species is present on the north side of Mt. Magazine in the dry upland forests. It is typically found on rock outcrops and sandstone bluffs or on very well drained slopes and ravines with abundant moisture (Tucker 1976, 1980). While this species is fairly abundant in the Interior Highlands Province (Tucker 1976, 1980), older specimens suffer from chestnut blight disease.
- *Caulophyllum thalictroides* - Blue cohosh
Blue cohosh has a wide range across much of the eastern United States. It has been reported from few Arkansas localities (Smith 1988) but a number of additional localities have been found by U.S. Forest Service botanists since 1989 (Gary Tucker, personal communication 1992). On Mt. Magazine it is especially abundant on the north slopes of Mossback Ridge and on the west end of the Mountain.
- *Dennstaedtia punctilobula* - Eastern hay-scented fern
This species has been collected from several locations on Mt. Magazine, where it is locally abundant. It occurs most often in shaded or partially shaded crevices of rock outcrops, where it is found in large but scattered clumps around the bluffs and in the vicinity of springs and seeps. It is also particularly common on the north slopes of the Mountain (Tucker 1976, 1980).
- *Deschampsia flexuosa* - Crinkled hairgrass
Crinkled hairgrass is a species of the Southern Appalachians known from a few scattered localities in Arkansas. On Mt. Magazine it occurs on bluffs and wooded outcrops on both the north and south sides of the Mountain.
- *Dryopteris spinulosa* - Spinulose wood fern
A small population of this species can be found in the northwestern part of the Mountain and outside the area of proposed park development. The Mt. Magazine population is one of two known for Arkansas, the other locality is further north near the Missouri state line.
- *Eriocaulon kornickianum* - Small-headed pipewort
This species is endemic to small scattered areas in Texas, Arkansas, Oklahoma, and Georgia. Several localities are known in Arkansas for this species, a number

of which have been lost or destroyed. One of these localities is on top of Mt. Magazine where the small-headed pipewort is believed to be extirpated as a result of natural succession (it has not been observed since 1982), specifically, the succession of open habitats by woodland species. This species was very abundant on the Mountain during the 1960s (Tucker 1988). Its habitat includes upland sphagnum seeps and boggy areas that are wet much of the year. An important habitat requirement of this species is open area that receives full sunlight (Tucker 1980). The availability of these habitats on the Mountain appears to be diminishing as a result of natural forest and woodland succession around sphagnum seep communities.

- *Erysimum capitatum* - Western wallflower
This species occurs on the western end of the mountaintop. Long recognized as a component of the open, sunlit grassy openings on the west end, it is now known that the best populations are found on shaded mesic sites just below the bluffline. This area is not contained in the affected environment of this proposed action.
- *Gentiana saponaria* - Soapwort gentian
This species has been reported to occur at one location on Mt. Magazine in the northwest part of the plateau in the sphagnum seep community. This area is not contained in the affected environment of the proposed action.
- *Paronychia virginica* var. *scoparia* - Broom nailwort
On Mt. Magazine, this species occurs on the rocky ledges and outcrops on both the north and south sides of the Mountain. Mt. Magazine supports the best of the few reported populations in Arkansas.
- *Quercus shumardii* var. *acerifolia* - Maple-leaf oak
This species was first collected on Mt. Magazine as early as 1924. It is common on the north face of Mt. Magazine on the rocky upper slopes and in open woods along the ledges and cliffs in the vicinity of Brown Springs, Dripping Springs, and Cameron Bluff. This species was once known only from Mt. Magazine. Several additional Arkansas populations were discovered, however, during the 1991 field season. A total of at least seven populations are now known from Logan, Montgomery, Polk and Sebastian Counties (Johnson, personal communication 1992). Recently, this variety has been classified as a distinct species, *Q. acerifolia*, by Hess and Stoyanoff (1990).
- *Ribes cynosbati* - Prickly gooseberry
In Arkansas, this species is known from several localities, one of which is on Mt. Magazine. It is locally abundant in the mesic bluffline community on the north side of the Mountain. Several other specimens have been noted in the mesic oak-hickory forest community north of Forest Development Road 1606 in the vicinity of the proposed visitor information center. The prickly gooseberry grows in rocky, yet moist woods and on north-facing shaded bluffs and wooded ledges at high elevations (Tucker 1980).
- *Sedum ternatum* - Wood stonecrop
Wood stonecrop is known from scattered Arkansas localities. Typically it occurs on moist shaded ledges and rocky woods along Mountain streams. A historical

occurrence on the east end of the Mountain (but without exact location) is known, but at the present time there are no known occurrences on the Mountain.

- *Stachys eplingii* - Epling's wood nettle

Epling's wood nettle is found in two geographic areas, the Southern Appalachians and west-central Arkansas. On Mt. Magazine it is associated with moist rich soils having high species diversity on the north slopes of Mossback Ridge and similar areas on the west end (outside the affected environment of the proposed action).

- *Tradescantia ozarkana* - Ozark spiderwort

The Ozark spiderwort appears to be of more local occurrence on the Mountain than the closely related *Tradescantia ernestiana*. The two species, however, appear to occupy similar habitats (rich often rocky woods and steep wooded slopes) and do not appear to be well isolated ecologically. Ozark spiderwort has been found on north-facing slopes of Mossback Ridge and other parts of the west end of the Mountain as well as in Bear Hollow.

- *Veratrum woodii* - Wood's false hellebore

The U.S. Fish and Wildlife Service once considered this a C2 species but reduced it to a 3C3 status after determining that it was known from too many sites to merit federal listing. The Mt. Magazine population is largely centered on the north slopes of Mossback Ridge, with additional plants found on the west end and on north slopes below the bluffline (both areas outside the affected environment of the proposed action).

- *Woodsia scopulina* var. *appalachiana* - Rocky Mountain woodsia

In Arkansas, this species is currently known only from Mt. Magazine. It is common on the sandstone ledges and associated talus slopes in the crevices of rocks along the north side of the Mountain and in the springs and seep areas. It is probably most abundant on the talus below the bluffline on the north side and is almost totally outside the effected environment of the proposed action (Tucker 1976, 1980, 1990a).

3.9.3 Wildlife (Vertebrates)

The analysis of the PETS vertebrate species was accomplished utilizing the list developed by the U.S. Forest Service for the Ozark-St. Francis National Forests which includes Mt. Magazine. This list incorporates the U.S. Fish and Wildlife Service list of federally protected species as well as species of special concern to the U.S. Forest Service. This includes species not considered to be threatened or endangered across their entire range but which are unique or limited in Arkansas. Although there is no official state list, the Arkansas Game and Fish Commission (the agency responsible for approval and administration of a state animal list) works in co-operation with the Arkansas Natural Heritage Commission to maintain records of occurrence (Roberg, personal communication 1992; Foti, personal communication 1992). Those taxa evaluated include not only those specifically identified from the plateau of Mt. Magazine, but also any which may have the potential to occur on the Mountain and for which required habitat exists.

Federally Listed Species

This review indicated there are two vertebrate species listed as endangered that could potentially exist within the areas impacted by the proposed alternatives. These are the bald eagle (*Haliaeetus leucocephalus*) and the mountain lion (*Felis concolor*).

The bald eagle (*Haliaeetus leucocephalus*), has been reported by local residents as occurring in the vicinity of Mt. Magazine and as roosting in snags close to the plateau (Odegard, personal communications 1991, 1992). To date, the Arkansas Audubon Society has not recorded the bald eagle as having been sighted in or around Mt. Magazine (Parker, personal communication 1992). The lack of an established record indicates the presence of the bald eagle is not a routine occurrence and the plateau provides little in the way of habitat or food for the bald eagle. Therefore, the likelihood of effects associated with this project is negligible, and no further analysis of this species was considered in this EIS.

The mountain lion (*Felis concolor*) continues to receive attention from various sightings by individuals; however, extensive efforts to document the occurrence of a wild population have been unsuccessful. Many of the documented sightings have been attributed to captive escapees (McBride 1991). Since no real confirmation exists to indicate a wild population survives in Arkansas, the likelihood of effects associated with any of the alternatives considered within the context of this EIS is negligible. Therefore additional consideration was not given to this species.

The Texas horned lizard (*Phrynosoma cornutum*) is a federal C2 species but has not been listed as endangered or threatened. A review of the habitat requirements indicated this species could exist on the plateau of Mt. Magazine. Field surveys to date have not verified its occurrence. However, it is unlikely that the proposed action could have an effect on the continued viability of this species on Mt. Magazine. Therefore, no additional consideration was given to this species.

U.S. Forest Service and State Status

The U.S. Forest Service has listed three species which have been found or for which suitable habitat is present in quantities to support their existence on Mt. Magazine (Table 3.4). In addition, the Arkansas Natural Heritage Commission has listed an additional species not previously indicated on the U.S. Forest Service list. After review of habitat requirements and site-specific field surveys, it is unlikely a project of this type and/or magnitude could have an effect on the continued viability of these species on Mt. Magazine with the exception of the rufous-crowned sparrow. Therefore, only the rufous-crowned sparrow was analyzed further in this EIS.

- *Aimophila ruficeps* - Rufous-crowned sparrow
A population of rufous-crowned sparrows inhabits the juniper-hardwood woodlands plant community along the Mountain's south-facing escarpments. It has also been reported from the East End Picnic Area, but efforts to document consistent occurrences at this location have not been successful.

Table 3.4. List of U.S. Forest Service PETS vertebrate species and State species of concern which occur or have the potential to occur within the areas considered for development on Mt. Magazine.

Species	Common Name	U.S. Forest Service Status ¹	State Ranking ²
<i>Aimophila ruficeps</i>	Rufous-crowned sparrow	Sensitive	S1
<i>Crotalus atrox</i>	Western diamondback rattlesnake	Sensitive	None
<i>Lampropeltis triangulum amaura</i>	Louisiana milk snake	None	S1
<i>Plethodon serratus</i>	Southern red backed salamander	None	S2

1. Forest Service PETS list status categories include:

- P = Proposed for federal listing as either Endangered or Threatened by U.S. Fish and Wildlife Service.
- E = Listed by U.S. Fish and Wildlife Service as Endangered.
- T = Listed by U.S. Fish and Wildlife Service as Threatened.
- S = Sensitive (any species on the list having no U.S. Fish and Wildlife Service - initiated federal status).

2. State ranking information obtained from Arkansas Natural Heritage Commission, Little Rock (State Inventory List dated 11 December 1991).

- S1 = Extremely rare.
- S2 = Very rare.
- S3 = Rare to uncommon.
- S4 = Common.
- .1, .2, .3 = A single decimal digit after a State rank may be used as a finer subdivision to further clarify a rank.

This population of rufous-crowned sparrows is of special concern because it is one of two known breeding populations in Arkansas (Shepherd, personal communication 1991) and until recently, represented the eastern-most known extension of its range. Since the original sighting on the Mountain, other populations have been reported from nearby Mt. Nebo and from the Ouachita Mountains in northern Pike County (Shepherd, personal communication 1991). The current breeding status of the Mt. Magazine population is unclear as are the other occurrences in Arkansas. Other than reports of sightings and observations of feeding activity, there is little information regarding the Arkansas populations. It appears as though Mt. Magazine is utilized on an intermittent basis by the species when conditions are favorable.

Although little is known regarding the Arkansas populations, the rufous-crowned sparrow is listed as a common resident of mixed chaparral and coastal sage brush in California (Dobkin, 1983). Despite this geographic separation between populations, assumptions based on information from California populations were utilized in the analysis of potential effects resulting from the proposed alternatives.

In California, the preferred habitat of the rufous-crowned sparrow includes steep rocky hillsides with sagebrush from 1-4 ft tall with little vegetative ground cover (Verner and Boss 1980). They may be found on grassy slopes without shrubs as long as rock outcrops are present (Grinnell and Miller 1944). It is thought that fire is important in maintaining habitat for the sparrow.

Nesting is generally on the ground, underneath rock outcrops and occasionally in lower portions of shrubs. Breeding occurs mid-March to mid-June, peaking in May. The clutch size is generally 3-4 eggs which are incubated by the female only (Dobkin 1983); however, the young are tended by both parents.

Information on nesting and reproduction indicates breeding territories may occur in groups (Penberton 1910). Nesting density indicates 6-27 pairs per 100 acres and estimated home-range from 1.2-3.2 acres. If these numbers are considered as typical, the estimated maximum population on Mt. Magazine would be 2.6-10.8. Field observations to date have not been able to document more than two breeding pairs during any one nesting season which is within the density estimates for California populations.

Field observations indicate the majority of the birds' food consists of insects; however, the analysis of crop contents of 25 rufous-crowned sparrows indicated 79 percent of the summer diet was composed of seed and vegetative material. Animal contents included grasshoppers, beetles, ants and other miscellaneous insects (Martin et al. 1951).

To date the exact status of the Mt. Magazine population is unclear. Attempts to locate specimens during breeding periods are not always successful. This may be due to the preference for ground escape on foot rather than immediate flight. It appears as though the rufous-crowned sparrow utilizes the area to the west and down slope of the old lodge site when conditions are favorable (Shepherd, personal communication 1991). In California, the populations have exhibited some movement to higher elevations (up to 4,000 ft) during post-breeding periods; however, the species is generally considered as non-migratory (Dobkin 1983). Eggs and nestlings are preyed upon by snakes and small mammals, and cowbird parasitism has been documented in this species (Friedmann 1971).

The rufous-crowned sparrow has been characterized as tolerant of "heavy human contact" as long as it is not directly associated with nesting areas. The species has also been known to

abandon nest sites which were "subjected to intense foot traffic in immediate vicinity" (Carlson, personal communication 1992).

3.9.4 Wildlife (Invertebrates)

Currently, nine species of invertebrates are listed as Category 2 (C2) species and are known from Mt. Magazine. The American burying beetle (*Nicrophorus americanus*), has been listed by the U.S. Fish and Wildlife Service as a federally listed endangered species but has not been documented on the mountaintop. A second species, Magazine Mountain shagreen (*Mesodon magazinensis*), is a federally listed threatened species and does occur on Mt. Magazine. Additionally, one species (*Lirceus bicuspidatus*) is listed as "rare or uncommon in the State" (S3) by the Arkansas Natural Heritage Commission. Table 3.5 lists the species known from Mt. Magazine along with their status designation.

Category 2 is designated for "taxa for which information is on hand for listing as threatened or endangered. But, conclusive data on vulnerability and threat are not available to support listing. Additional information is needed to ascertain status."

Some species are clearly understudied. An example is *Paravitrea aulacogyra*, a land snail. This snail was described by Pilsbry and Ferris (1906) from one dead specimen found in talus on the north side of the Mountain. The living animal has never been seen. The scientific community today would disregard a description based upon one specimen. Until verified by collected specimens and the taxonomy verified, it is hard to consider this as a rare animal as it is treated in some reports. Hubricht (1985) suggested its taxonomic identity was questionable because it was considerably larger and had fewer whorls than other species of *Paravitrea*.

- *Acalypta susana* - Lacebug
This species of lacebug has been described by Allen et al. (1988) from bryophyte and slime mold-covered logs on Mt. Magazine, both at the base of the Mountain and at 2,000 ft elevation. It has been found at additional localities in the Interior Highlands since its original discovery on the Mountain (Allen, letter to Lynn Neff 1988).
- *Arianops sandersoni* - Mold beetle
This species is of rare occurrence on Mt. Magazine. The genus *Arianops* consists of three species in the Interior Highlands region, all of which are of limited occurrence. The primary distribution of this genus is in the more mesic Southern Appalachian mountain region. Carlton (personal communication, 1992) indicated that he and others originally thought the species was restricted to rock crevices deep below the surface. More recent field studies, however, have led to the belief that it is strictly associated with leaf litter and is "truly a very rare species." It probably is not restricted to highly mesic sites on the Mountain but also could be found on drier wooded sites.
- *Lirceus bicuspidatus* - Isopod
This isopod was found by Hubricht and Mackin (1949) at "a stream, on side of Magazine Mountain, 2.6 miles southeast of Corley." Additional localities were listed from Jackson, Newton, Yell, Pope, Conway, and Johnson counties. If

Table 3.5. Species of invertebrates listed by federal or state agencies that are known to occur on Mt. Magazine and their status rating.

Taxa	Common Name	Federal Status	State Status
<i>Acalypta susana</i>	Lacebug	C2	
<i>Arianops Sandersoni</i>	Mold beetle	C2	
<i>Lirceus bicuspidatus</i>	Isopod	None	S3
<i>Mesodon magazinensis</i>	Magazine Mountain shagreen	T	
<i>Ouachitychus parvocolus</i>	Short-winged mold beetle	C2	
<i>Paraleptophelebia calcarica</i>	Mayfly	C2	
<i>Paravitrea aulacogyra</i>	Land snail	C2	
<i>Paucicalcaria ozarkensis</i>	Caddisfly	C2	
<i>Scaphinotus parisiana</i>	Snail-eating beetle	C2	
<i>Speyeria diana</i>	Diana fritillary	C2	
<i>Stygobromus elatus</i>	Amphipod	C2	

C2: Taxa for which information is on hand and are possibly appropriate for listing as threatened or endangered, but conclusive data on the species' vulnerability and threat are not available to support listing proposals at this time. Additional information is needed to ascertain status.

S3: Rare or uncommon in state.

T: Federally listed as threatened species, fully covered by the Endangered Species Act.

Hubricht has accurately reported the mileage from Corley, this would be the base of the Mountain.

- *Mesodon magazinensis* - Magazine Mountain shagreen
The Magazine Mountain shagreen is a terrestrial land snail known only from Mt. Magazine. The species was described in 1906 from a suite of specimens collected on the Mountain in 1903. The habitat is the talus slopes on the north and west slopes of the Mountain and the north-facing slope of Bear Hollow (Figure 3.3). This snail was not found on the south-facing slope of Bear Hollow. All areas designated for potential development are outside the range of *M. magazinensis*. Caldwell (1986) discussed the status of the species.
- *Nicrophorus americanus* - American burying beetle
The American burying beetle, formerly distributed throughout temperate eastern North American, is now known from several locations in Oklahoma and Arkansas, as well as Nebraska, southwestern Missouri and on Block Island, off the southern coast of Rhode Island. It has been federally listed as endangered because of an apparent drastic decline and extirpation over most of its entire range. Recent discoveries of the American burying beetle have been made elsewhere in Logan and Yell counties, but it has not been found on top of Mt. Magazine. A nighttime pitfall trapping survey did not establish the presence of the species on top of the Mountain.
- *Ouachitychus parvovulus* - Short-winged mold beetle
This species is similar in many respects to *Arianops sandersoni*. It has been found at Bear Hollow and also elsewhere in the Interior Highlands (Allen 1991c). It is found in similar habitats to *Arianops sandersoni*.
- *Paraleptophlebia calcaria* - Mayfly
This mayfly species was described by Robotham and Allen (1988) and is known only from a locality on Gutter Rock Creek below Green Bench Road, at the base of Mt. Magazine. It is not known from within the proposed project area and is known from elsewhere in the Interior Highlands region (Allen 1991c).
- *Paravitrea avlacogyra* - Land snail
This snail was described from a single dead specimen found on the tolus slope on the northern side of Mt. Magazine. Because no additional specimens have been collected and no living specimens seen, its taxonomic identity and status as rare on the Mountain is questionable. It is not known from the proposed development area.
- *Paucicalcaria ozarkensis* - Caddisfly
This caddisfly species is known from a single locality on Gutter Rock Creek at the north base of the Mountain well outside the proposed development area. It is endemic to the Mt. Magazine area at the genus level.
- *Scaphinotus parisiane* - Snail-eating beetle
This species was described by Allen and Carlton (1988) from the northwest slope of Mt. Magazine, a location outside the proposed development area. It has been found elsewhere in the Interior Highlands (Allen 1991c).

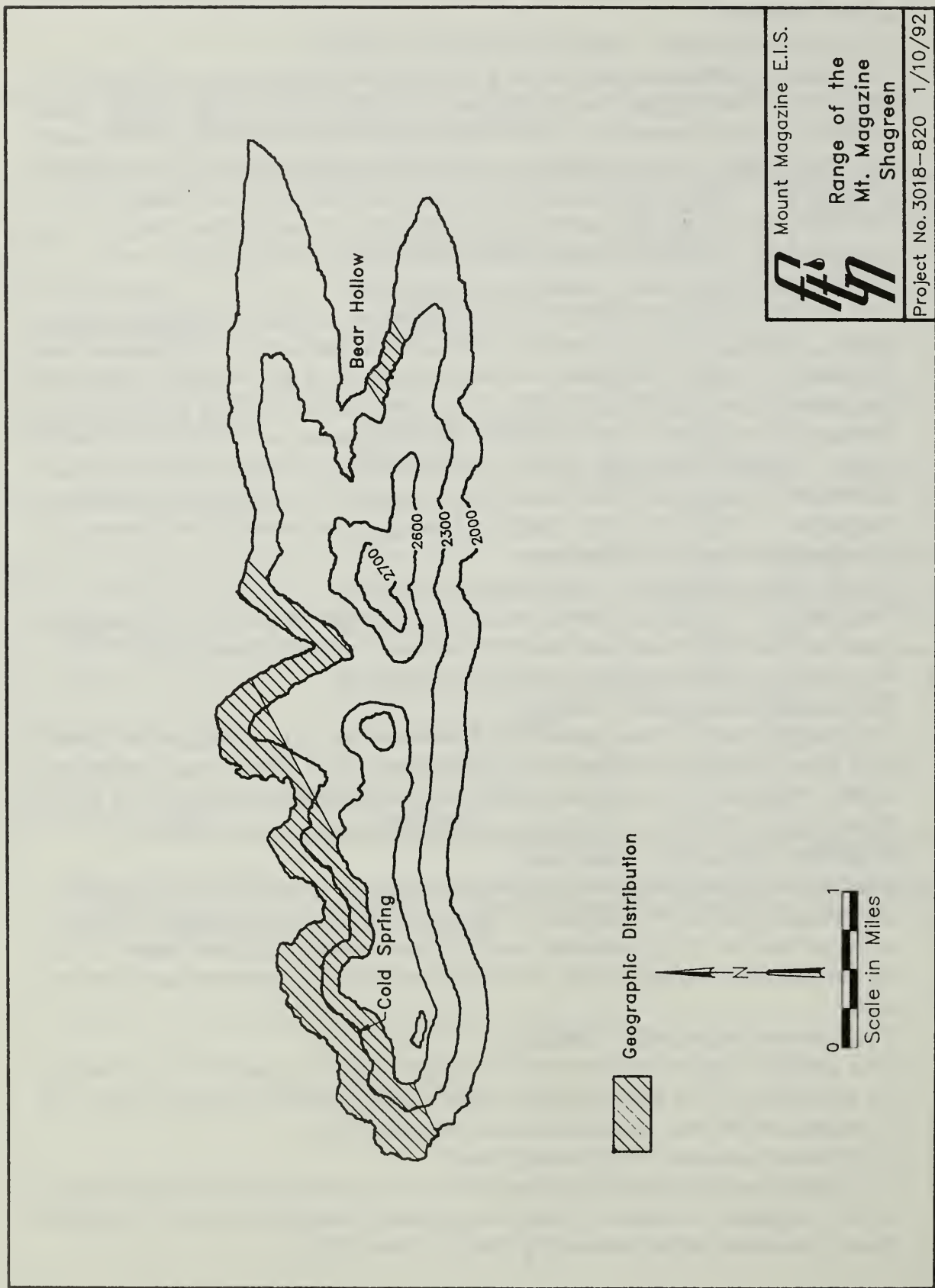


Figure 3.3. Geographic distribution of the Mt. Magazine shagreen (*Mesodon magazinensis*), Mt. Magazine EIS (modified from Caldwell 1986).

- *Speyeria diana* - Diana fritillary
The Diana fritillary is a large colorful butterfly that was once distributed throughout the eastern United States. Through habitat destruction, however, it has been extirpated from large areas of the country. Opler and Krizek (1984) reported it from four disjunct populations in eastern North America. The Ozark population apparently once ranged over a broad area in Arkansas. There are historical records from Little Rock and Hope, Arkansas, but Magazine population represents the only known State locality at present (Allen 1988).
- *Stygobromus elatus* - Amphipod
This species is a supposedly endemic amphipod (also known as a Scud) described in 1967 (Holsinger 1967). Based on collections made in 1991 however, Holsinger expressed doubts as to the validity of the species (Holsinger, 1991). Holsinger suggested that *S. elatus* possibly should be recognized as a morphological form within the range of normal variability of the widely distributed *S. alabamensis*. He identified all specimens collected on the Mountain in 1991 as *S. alabamensis*.

Dr. Robert T. Allen, entomological researcher, is preparing for publication the descriptions of several new species that may represent endemic species. One of these species, a jumping bristletail, has been assigned the manuscript name of *Pedetontus gerschneri*, but the name has not been published and probably will not be published prior to publication of the EIS (Allen, personal communication).

Those PETS species that have not been recorded or are not known from the 2,200 acre affected environment on the Mountain were not carried over for further analysis in this document.

3.9.5 PETS Species Studied Further in this FEIS

A large number of PETS species are known from or are thought to occur on Mt. Magazine. The proposed or existing activities associated with Alternatives A through E, however, will not effect all known or potentially occurring PETS species on Mt. Magazine. In fact, a large number of PETS species will not be affected by the existing or proposed activities on the Mountain, therefore, were not carried over for study in this EIS. Only those PETS species that potentially would be affected by the proposed action were studied further in this EIS. The PETS plant species carried over for further study include: Ouachita leadplant (*Amorpha ouachitensis*), Bush's poppy mallow (*Callirhoe papaver* var. *Bushii*), Ozark chinquapin (*Castanea pumila* var. *ozarkensis*), small-headed pipewort (*Eriocaulon kornickianum*), soapwort gentian (*Gentiana saponaria*), broom nailwort (*Paronychia virginica* var. *scoparia*), maple-leaf oak (*Quercus shumardii* var. *acerifolia*), prickly gooseberry (*Ribes cynosbati*), and Eastern hay-scented fern (*Dennstaedtia punctilobula*). One PETS vertebrate species, the rufous-crowned sparrow (*Aimophila ruficeps*) and two PETS invertebrate species, Magazine Mountain shagreen (*Mesodon magazinensis*) and the Diana fritillary (*Speyeria diana*) were carried over for further study in this EIS.

3.10 Cultural Resources

The following summary and assessment of archeological and historical resources is based on previously recorded properties which are in the State's site files, references to properties as obtained from several published documents, and the results of the archeological survey conducted for this EIS. Primary sources of information relative to historic sites, such as deeds, tax records and census data, have not been examined.

The locations investigated during the archeological fieldwork consisted of a sample of potential development or construction areas within the proposed state park. About 160 acres, 9 miles of horse or hiking trails, more than one mile of new access roads, and 2.25 miles of proposed water line corridors were intensively examined by conducting shovel tests on transects and controlled excavation units. The results of this field study are summarized in Chapter 4.0. The complete report conducted as part of this study is entitled "A Cultural Resources Assessment and Archaeological Survey of Selected Areas of the Proposed State Park on Mt. Magazine, Logan County, Arkansas" (Spears 1992). Due to the fragile nature of archeological sites, site locations are not released to the public and are not presented in this document. All sites and properties within the proposed project area must be identified and evaluated in terms of their significance and eligibility for listing on the National Register of Historic Places (National Register).

3.10.1 Prehistory and History

Prehistory

The earliest sites in Arkansas are related to the Paleo-Indian Period, which archaeologists have dated from about 12,000 B.C.-7,000 B.C. Little is known about these early nomadic hunters and gatherers, since sites with intact deposits dating to this period are few. What remains are distinctive stone tools which were used to hunt large animals which are now extinct. These tools have been found in diverse environments throughout the State. To date, no Paleo-Indian sites have been recorded on Mt. Magazine; however, archeological surveys have not been conducted over the entire Mountain.

Archaeologists refer to the subsequent cultural period dating from 7,000 B.C.-500 B.C. as the Archaic. The Archaic is well represented in Arkansas, and six sites dating to this period have been recorded on Mt. Magazine. The environment during the Archaic had become much like it is today and supported a wide range of plants and animals. The Indians successfully exploited a variety of natural resources and, as a result, invented numerous specialized stone, bone, and wooden tools. The population of the people greatly increased throughout this period with groups living, hunting or utilizing all physiographic/topographic settings in the State. Sites investigated during this study are small camps or special activity areas, such as lookouts or butchering stations. They lack characteristics which would render them eligible for nomination to the National Register; however, additional surveys may result in finding Archaic sites with intact deposits which have a higher research value.

Beginning about 500 B.C., there was a dramatic change in the culture when people began growing their own food on a limited basis through horticulture. This change along with the introduction of pottery, marks the beginning of the Woodland cultural period. As the reliance on growing food increased, and plants such as maize were introduced, a fully agricultural society developed. Archaeologists call this the Mississippian period of cultural development.

The regional expressions of these agricultural societies varied greatly and their descendants probably developed into the different tribes observed when Western explorers entered the region. Sites in the Arkansas Valley were inhabited by Fourche Maline or pre-Caddoan and Caddoan Indians. These cultures lived in small dispersed farming settlements, and they interacted at regional ceremonial centers. These centers were small and usually contained only a few mounds. These cultures contrast with the Mississippi Valley cultures to the east who lived in large villages which were sometimes enclosed in a palisade. Their ceremonial centers were larger and contained numerous mounds. Differences between cultures are observed in the stone tools, ceramic vessel shapes and designs, house size and shape, and ceremonial items, such as pipes.

It is doubtful that large villages or large ceremonial centers were ever located on Mt. Magazine, but specialized activity sites and small seasonal or permanent camps along with pictographs (drawings) are likely. During this study, Woodland and Mississippian artifacts were found at 3LO439. The site is located outside of the affected environment in a small overhang or bluffshelter which lies above a spring drainage near the top slope of the Mountain. The presence of Site 3LO439 indicates the high probability that other sites dating to this period are likely to be found as more of the area is surveyed. Also, animal and bird bones were collected in the deposits indicating that the site contains information on prehistoric diet and subsistence. While outside of the affected environment, due to its high research value, 3LO439 is potentially eligible for nomination to the National Register. Until it is evaluated through significance testing, it should be protected.

History

The recorded history of Mt. Magazine can be divided into at least four periods: Pioneer Settlement, Maximum Occupation, Resort period, and the Great Depression. The Pioneer Settlement period occurred from 1780-1850 as the first Anglo-Americans arrived to live in the region. By the end of this period all usable land in every part of the State was marked by medium density farming. The Maximum Occupation period between 1840-1930 saw the use of all marginal land in Arkansas occupied. Most of the farms on the top of the Mt. Magazine were settled during this period. The Resort period occurred between 1840-1930. It is during this time that people began to journey to places for recreation or for rejuvenation purposes. These new settlements or resorts were located at reputed medicinal springs and on mountaintops. Sometimes these occasional visits resulted in longer stays and led to permanent settlement. During the Great Depression of the 1930s, severe economic hardships resulted in the loss of private land to the government for back taxes. The government instituted public works programs such as the CCC and the WPA to help improve the welfare of the people and the national economy. CCC/WPA projects included building roads, firetowers, and recreation areas such as Mt. Magazine Resort.

The burning of the Logan County Courthouse in 1877 destroyed all the records of the Mountain, but it is clear from early accounts that many of the first residences on the Mountain were short-term cabin sites of hunters and others for whom it may not have been important or necessary to file claims. Mr. Seabourn from Pennsylvania is considered to be the first settler on the Mountain. He built his cabin west of the East End Picnic Area in the 1850s.

During the 1870s and 1880s several families moved to the Mountain. Some came for the healthy climate. Among the early settlers were T.R. Cameron from Georgia, Fredrich A. Morsbach from Prussia, B.H. Benefield from Missouri, W. Sion House from Georgia, Benjamin Brown from North Carolina, T.M.C. Birmingham from Ireland, S. Dill from Ohio, Mary Greenfield from Tennessee, David W. McGuire and others. These families cleared land for farming and orchards. They sold the produce (onions, corn, vegetables, apples, peaches, berries, etc.) to the surrounding communities. The Greenfields rented cabins and the Browns operated pack jennies for tourists. The children living on the Mountain were educated at the first school house, Summer Home School, which was built in 1881 and burned in 1919. This archeological site remains intact. Church services were also held at the school and in homes. Arbor revivals were popular. Apparently cleansing ceremonies were conducted at several of the Springs. A few residents were buried on the Mountain including Serena Morsbach, wife of Albert Morsbach, who was the son of Friedrich. She died while giving birth and is buried with her baby in a marked grave on the north slopes of Signal Hill. Mrs. Corder, a midwife, is also buried in this remote setting. She apparently did not want her body hauled down off the Mountain because of the rough road.

The first development was Meda Springs where lots were sold beginning in 1881. In 1900, the town of Mt. Magazine was platted on the west end of the Mountain. Developers hoping to increase the water supply for their real estate venture dynamited Meda Spring, causing it to become "Dripping" Springs. The hotel called the Skycrest opened at the turn of the century. It attracted guests from the large cities, who would arrive by train at the station in Blue Mountain and be taken by wagon or buggy up a steep, winding road to the hotel. A subdivision of the town of Mt. Magazine called Dakota Heights expanded the number of lots which could be bought in the town. Several summer homes were built in these two areas and later in the Buckman subdivision on the east end of the Mountain. The resort business was fairly short lived, lasting only two decades. In the 1920s there were attempts to revive the businesses and hotel which had decayed. By the 1930s much of the land had reverted to government ownership.

In the 1930s, the remaining land on Mt. Magazine was acquired by the government, and development planning was begun by the United States Resettlement Administration. Recreational needs of the area were assessed, and the two lakes were built at the foot of the Mountain. The "high standard graveled road" from Havana to Paris was also constructed. Plans were then drawn for the resort development on top of the Mountain. On August 30, 1938, President Roosevelt proclaimed the project an addition to the Ouachita National Forest with administration by the U.S. Forest Service and Soil Conservation Service. The cottages were finished and rented in 1939 and the lodge was dedicated in 1940. By the fall of 1941, a project report from the work camp at Corley states, "completed Mt. Magazine Resort Area Grounds work, water system, transmission line and 4 unit flush type latrines."

The resort included the lodge (2 stories with 26 bedrooms), 18 cabins, a concession building, a dormitory, a power generating station, water and sanitary system, an amphitheater, overlooks, picnic areas (East End, West End, Cameron Bluff and small picnic developments at Brown Springs), rim trails and campgrounds. Maps of the proposed resort and blueprints of structures are on file with the U.S. Forest Service, Ozark-St. Francis National Forests in Russellville. The War, the shortage of water, and deteriorating roads hampered the success of

the resort. To quote an article about the cottages in the *Fort Smith Times Record* on June 4, 1944, "War restrictions will hold rentals to persons bringing their own foods, towels, bed linens, pillows and blankets, providing their own refrigeration. Kerosene may be bought on the Mountain . . . and ice deliveries may be made later in the summer. There are 18 cottages available each with combination bedroom-living room, screened front porch, kitchen, kerosene stove and refrigerator and water heater, and bathroom with shower."

After the lodge burned in 1971, the Mountain's use as a resort suffered. It has since become a popular location for environmental research and for those who enjoy the vistas, primitive camping, horseback riding, hiking, rock climbing, star gazing, and hang gliding.

3.10.2 Archeological Sites and Historic Properties

As a result of the literature search for information on archeological and historic properties on Mt. Magazine, a total of 58 sites have been identified. These sites are listed in Table 3.6. Each of these sites and properties are described in Spears (1992). Sites and properties, which were found inside the development areas surveyed and are recommended for further work, are so noted in Table 3.6. These sites and the effects on them are described in Chapter 4.0 of this EIS.

3.11 Socioeconomic Environment

3.11.1 Economic Area

The area of primary economic impact from Mt. Magazine is Logan County and Yell County, Arkansas (Figure 3.4). Mt. Magazine is located in Logan County and is only approximately five miles from Yell County. Access to the primary impact area is through the three entry point counties of Franklin, Johnson, and Scott; however, Russellville will most likely serve as a primary entry point from Interstate 40. The Cities of Ozark (Franklin County) and Clarksville (Johnson County) would be the primary entry points off of Interstate Highway 40, while Waldron would be the primary entry city for Scott County off of Highway 71. The Cities of Paris and Booneville would be affected in Logan County as would be Danville and Dardanelle in Yell County, with smaller communities also being impacted.

3.11.2 Population

In any proposed project such as this, one consideration is the impact on the resident population. There will be tax receipts accruing to the State and nation from both sales and income generated, as well as interindustry effects. However, it is the local population that is primarily affected. The resident population may be the most important resource of a local area, because without population, there are no economic dimensions. Population is the income-producing foundation of the local area through provision of labor inputs. First, it should be noted that the primary employment area of Logan and Yell Counties enjoyed what appears to be significant population growth from 1960-1990 with 28 and 47 percent growth, respectively. Closer examination, however, reveals that the growth was greatest in the 1970-1980 decade. In fact, most of the communities within the two counties suffered population losses for the more recent 1980-1990 time period. This observation is consistent with the national trends of slower population growth in the rural areas. The population patterns of the secondary employment area (i.e., Counties of Johnson, Franklin, and Scott) are even more obvious. The population growth

Table 3.6. Summary of archeological sites and historic properties on Mt. Magazine.

Site Number	H*	P**	Site Name/Type	Age/Date	NRHP***	Status
Mossback Ridge (7 sites)						
3LO79 [†]	X		Housesite?	1900s		unknown
		X	Isolated finds	Archaic		not eligible
3LO123 [†]	X		Original firetower location	1938		not eligible
3LO435 [†]	X		A. Morsbach House, well	1890s-1926		potentially eligible
49-50 [†]	X		Clara Morsbach House	1880s		unknown
49-52 [†]	X		Spring	1900s-1939		unknown
3LO436 [†]	X		Cement water tank, well	?-1971		unknown
49-56 [†]	X		Spa/spring	Late 1800s		unknown
Signal Hill and vicinity west (12 sites)						
3LO80 ¹	X		CCC/WPA Lodge & cabins	1939-1971+		potentially eligible ²
	X		Dormitory structure	1939-today		potentially eligible ²
	X		Wells	1939+		unknown ²
		X	Camp	Archaic		not eligible ³
3LO437	X		Landfill/dump	1938+		unknown

[†]Located outside of proposed development area.

¹Located inside development areas surveyed for Alternatives B through E.

²Further work recommended.

³No further work recommended.

⁴Located inside development areas surveyed for Alternatives D and E.

⁵Located inside development areas surveyed for Alternatives C through E

*H = Historic **P = Prehistoric ***NRHP = National Register of Historic Places.

Table 3.6. Continued.

Site Number	H*	P**	Site Name/Type	Age/Date	NRHP*** Status
3L087	X		House	1919-1930	not eligible
3L088	X		House and cistern	1910-1930	unknown
3L089	X		House, burned feature	1890-1930	unknown
3LO431 ¹	X		Sion House's farm, well	1880s-1920s	potentially eligible ²
			House's children's graves	?	needs protection ²
49-23	X		House Gap Foot Trails		unknown
49-26 ⁴	X		Golf Link	1920s	not eligible ³
3LO430 ¹	X		Water tank, well house	1930s	unknown ²
49-29	X		Rock wall	unknown	unknown
49-30		X	Metate/grindstone	unknown	unknown
49-31	X	X	Bear gap shelter	unknown	unknown
Brown Springs Area (3 sites)					
3LO429 ¹	X		Ben Brown House, spring	1880s-1920s	potentially eligible ²
	X		CCC/WPA picnic ground	1938-today	potentially eligible ²
		X	Isolated find	Archaic	not eligible ³

¹Located outside of proposed development area.¹Located inside development areas surveyed for Alternatives B through E.²Further work recommended.³No further work recommended.⁴Located inside development areas surveyed for Alternatives D and E.⁵Located inside development areas surveyed for Alternatives C through E

*H = Historic **P = Prehistoric ***NRHP = National Register of Historic Places.

Table 3.6. Continued.

Site Number	H*	P**	Site Name/Type	Age/Date	NRHP*** Status
49-28	X		Pet Brown or C. C. Brown Farm	Late 1800s-1930	unknown
3LO85	X		P. W. Clark Farm	1890-1930	unknown
Cameron Bluff (7 sites)					
3LO86	X		CCC/WPA Amphitheatre	1938-1960s	potentially eligible
49-58	X		CCC/WPA overlooks & picnic	1938-today	potentially eligible
49-44	X		T.R. Cameron House	1873-1930	unknown
3LO438	X		W.H. Bennett House	Late 1800s-1930s	potentially eligible
3LO439		X	Barn cave	Woodland-Mississippian	potentially eligible
49-42	X		Road to Reveille Valley	unknown	unknown
3LO440	X		Cellar or cabin site	Late 1800s	potentially eligible
Northeast Arm/extension (6 sites)					
3LO90 ⁴	X		F. Morsbach House	1880s-1915	potentially eligible ²

[†]Located outside of proposed development area.

¹Located inside development areas surveyed for Alternatives B through E.

²Further work recommended.

³No further work recommended.

⁴Located inside development areas surveyed for Alternatives D and E.

⁵Located inside development areas surveyed for Alternatives C through E

*H = Historic **P = Prehistoric ***NRHP = National Register of Historic Places.

Table 3.6. Continued.

Site Number	H*	P**	Site Name/Type	Age/Date	NRHP*** Status
3LO91 ⁴	X		Buckman House, Inn	1880s-1930s	potentially eligible ²
	X		McGuire Spring	Late 1800s	potentially eligible ²
	X		Buckman Pool	Late 1920s-1930s	potentially eligible ²
49-19	X		Millard Road	1880s	unknown
3LO432 ⁵	X		A.B. Lozier House, well	Late 1890s	potentially eligible ²
3LO433 ⁴	X		House foundation, well	Late 1800s	potentially eligible ²
49-42 ⁴	X		Will Apples Road	Late 1800s	potentially eligible ²
Greenfield Picnic Area and vicinity (4 sites)					
3LO92 ¹	X		Greenfield Farm, cabins	1880s-1939	potentially eligible ²
3LO93	X		Morsbach Cemetery	1896-1920	protected
	X		Summer Home School	1880s-1917	potentially eligible
49-48	X		Dr. James Workman House	Early 1900s-1930s	unknown
3LO434 ⁴	X		Whitman House/school	1910-1928	potentially eligible ²

¹Located outside of proposed development area.¹Located inside development areas surveyed for Alternatives B through E.²Further work recommended.³No further work recommended.⁴Located inside development areas surveyed for Alternatives D and E.⁵Located inside development areas surveyed for Alternatives C through E

*H = Historic **P = Prehistoric ***NRHP = National Register of Historic Places.

Table 3.6. Continued.

Site Number	H*	P**	Site Name/Type	Age/Date	NRHP*** Status
East End Picnic Area and vicinity (7 sites)					
3LO94 ¹	X		B.H. Benefield Farm	1880s-1930	potentially eligible ²
	X		Child's grave		protected ²
	X		CCC/WPA Recreation Area	1938-today	potentially eligible ²
3LO95	X		Grave of James W. Hardyce, C.E.	1955	protected
49-35	X		Seabourn cabin	1850s	unknown
49-36	X		Bagley House	Late 1800s	unknown
49-37	X		Waveland Road	1914-1930s	unknown
49-38	X		Wheeler House	1900s-1930s	unknown
49-61	X		Zeiler House	1912-1930s	unknown
Dripping Springs (5 sites)					
3LO81 ⁺		X	Camp	Archaic-Woodland	unknown
3LO96 ⁺		X	Camp	Archaic-Woodland	unknown
49-32 ⁺	X		M.C. Birmingham House	1880s-1930s	unknown

⁺Located outside of proposed development area.¹Located inside development areas surveyed for Alternatives B through E.²Further work recommended.³No further work recommended.⁴Located inside development areas surveyed for Alternatives D and E.⁵Located inside development areas surveyed for Alternatives C through E

*H = Historic **P = Prehistoric ***NRHP = National Register of Historic Places.

Table 3.6. Continued.

Site Number	H*	P**	Site Name/Type	Age/Date	NRHP*** Status
49-33&34 [†]	X		Dripping Springs, Dakota Heights	1880s-1930s	unknown
West End and Town of Mt. Magazine (7 sites)					
3LO83 [†]	X		Skycrest Inn	1900-1930	unknown
3LO84 [†]	X		S. A. Ribelin House	Early 1900s	unknown
49-39 [†]	X		Road to Blue Mountain	Late 1800s	unknown
49-40 [†]	X		Town of Mount Magazine	1900-1930s	unknown
49-43 [†]	X		C. Ferguson	1912	unknown
49-46 [†]	X		West End Store	1900-1910	unknown
49-53 [†]	X		Fire Tower and Rangers Residence	1939-present	potentially eligible

[†]Located outside of proposed development area.¹Located inside development areas surveyed for Alternatives B through E.²Further work recommended.³No further work recommended.⁴Located inside development areas surveyed for Alternatives D and E.⁵Located inside development areas surveyed for Alternatives C through E

*H = Historic **P = Prehistoric ***NRHP = National Register of Historic Places.

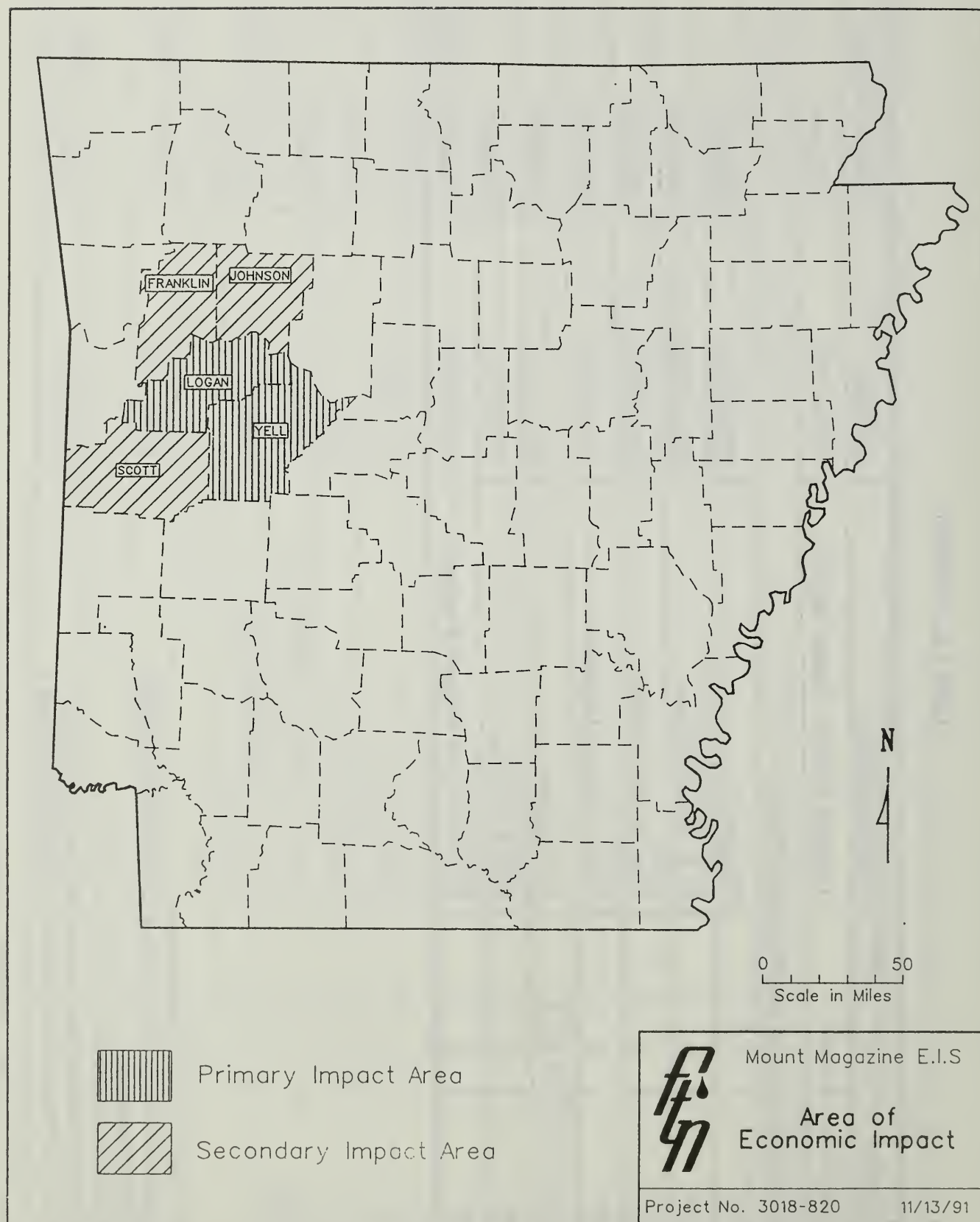


Figure 3.4. Area of economic impact.

of 3,207 in 1960-1970 and 8,674 in 1970-1980 had diminished to 1,419 in 1980-1990. The five-county area is not experiencing population growth similar to the rest of the nation. The population figures are presented in Tables 3.7 and 3.8. All of the population growth in Logan and Franklin Counties was attributed to natural increases (births exceeded deaths), since there was a net negative migration for 1980 - 1990. The net immigration to Yell, Johnson, and Scott Counties was relatively low. The population growth in both the primary and secondary county areas slowed dramatically during the past decade to well below the national average.

Tables E.1 through E.5 in Appendix E present population projections for the five counties comprising the impact area. The projected population for Logan County for the year 2000 is below the 1990 projection while Yell County is projected to have a population increase of only 1,345 persons for the next decade. A similar pattern exists for the secondary county area. The 1990 figures listed in the tables are projections and not actual census counts because at the time of the preparation of the EIS the 1990 census data were not available. Furthermore, they are consistently higher than the actual figures. In other words, the figures for 1990 were overestimated and the same probably holds true for the year 2000. These counties are clearly a low growth area.

More important than total population numbers with respect to an economic impact statement are the age distributions for the area expected in the future. The median age is expected to increase for all five counties with the percent of the population aged 19 and younger projected to decrease in both absolute and percentage terms. Another interesting phenomenon would be the emigration expected for the "mobile" elderly. The 65-69 age population is expected to leave while the "immobile" elderly of 85+ yrs are expected to stay.

3.11.3 Income

Table 3.9 presents the educational characteristics of the five counties being studied. Education levels and incomes of a population tend to be highly correlated so education is an important consideration. The year 1980 was chosen as a base year since it should reflect the incomes of the 1980-1990 time period. All five counties fared poorly compared to the State in general. When compared to the State, the population aged 25 yrs or older in the study area had a higher percentage with less than five years of elementary school and lower percentages for high school graduates and those with four or more years of college. The median years of school completed was also lower for Logan, Yell, Franklin, Johnson, and Scott Counties than for the State of Arkansas. With these educational levels, the income levels for the area are also expected to be lower.

Total and per capita personal income estimates are given for the five counties in Tables 3.10 and 3.11. The growth rates for the counties are almost uniformly above the growth rate of the State of Arkansas. This is encouraging for the area, but it may just be reflective of the low starting base. It should be pointed out that the per capita personal incomes of all five counties remains well below the State average, even when higher growth rates are taken into consideration. The income levels for the areas are significantly lower.

Tables E.6 through E.10 in Appendix E present the personal income by place of residence for the five individual counties. As previously mentioned, the growth rates in personal incomes compare favorably with the State in general, whereas the absolute levels do not. Certain elements of personal income should be pointed out. First, for Logan County and for

Table 3.7. Population of the primary employment area.

	1960	Absolute Change 1960-70	1970	Absolute Change 1970-80	1980	Absolute Change 1980-90	1990	Percent Change 1960-1990
LOGAN COUNTY	15,957	832	16,789	3,355	20,144	379	20,523	28.6
Blue Mountain	94	14	108	4	112	34	146	55.3
Booneville	2,690	549	3,239	479	3,718	86	804	41.4
Magazine	463	214	677	122	799	0	799	72.6
Morrison Bluff	0	-	49	20	69	15	84	-
Paris	3,007	639	3,646	345	3,991	-317	3,674	22.2
Scranton	229	-7	222	22	244	-26	218	-4.8
Subiaco	290	85	375	369	744	-206	538	85.5
YELL COUNTY	11,940	2,268	14,208	2,818	17,026	530	17,556	47.0
Belleville	273	106	379	192	571	-181	390	42.9
Danville	955	407	1,362	336	1,698	-113	1,585	66.0
Havana	277	31	308	44	352	6	358	29.2
STATE OF ARKANSAS	1,786,272	137,050	1,923,322	283,035	2,206,357	188,643	2,395,00	34.1

Source: U.S. Department of Commerce, 1960, 1970, 1980, 1990 Census of Population.

Table 3.8 Population of the secondary employment area.

	1960	Absolute Change 1960-70	1970	Absolute Change 1970-80	1980	Absolute Change 1980-90	1990	Percent Change 1960-1990
JOHNSON COUNTY	12,421	1,209	13,630	3,793	17,423	833	18,256	47.0
Clarksville	3,919	697	4,616	621	5,237	596	5,833	48.8
FRANKLIN COUNTY	10,213	1,088	11,301	3,403	14,705	78	14,783	44.7
Ozark	1,965	627	2,592	1,005	3,597	-267	3,330	69.5
SCOTT COUNTY	7,297	910	8,207	1,478	9,685	508	10,193	39.7
Waldron	1,619	513	2,132	510	2,642	382	3,024	86.8
STATE OF ARKANSAS	1,786,272	137,050	1,923,322	283,035	2,286,357	188,643	2,395,00	34.1

Source: U.S. Department of Commerce, Bureau of Census, 1960, 1970, 1980, 1990 Census of Population.

Table 3.9. Educational characteristics of area of economic impact, 1980.

County	Persons 25 Years Old and Over	Less Than 5 Years of Elementary School (percent)	High School Graduates (percent)	4 or More Years of College (percent)	Median years of School Completed (percent)
Primary Employment Area					
Logan	18,171	6.5	46.5	6.3	11.4
Yell	10,646	6.3	48.7	5.0	11.8
Secondary Employment Area					
Franklin	8,828	5.8	51.1	6.1	12.0
Johnson	10,666	6.6	47.8	8.7	11.6
Scott	6,028	5.6	42.4	3.7	10.7
State of Arkansas	1,149,467	4.6	58.4	11.5	12.2

Source: U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, General Social and Economic Characteristics.

Table 3.10. Total personal income estimates.

County	Total Personal Income (thousands)			Average Annual Growth (percent)	
	1970	1980	1988	1970-80	1980-88
Logan	\$39,029	133,914	231,414	13.1	7.1
Yell	34,787	111,479	197,402	12.4	7.4
Johnson	31,159	111,216	186,525	13.6	6.7
Franklin	28,870	95,370	167,994	12.7	7.3
Scott	17,844	57,643	110,669	12.4	8.5
State of Arkansas	5,456,401	17,096,574	29,254,753	12.1	6.9

Source: U.S. Department of Commerce, Bureau of Economics Analysis
(Washington, DC).

Table 3.11. Per capita personal income estimates.

County	Per Capita Personal Income (dollars)			Average Annual Growth (percent)	
	1970	1980	1988	1970-80	1980-88
Logan	\$2,320	6,639	11,177	11.1	6.7
Yell	2,430	6,538	10,859	10.4	6.5
Johnson	2,276	6,356	10,124	10.8	6.0
Franklin	2,558	6,479	10,713	9.7	6.5
Scott	2,147	5,949	10,500	10.7	7.4
State of Arkansas	2,827	7,465	12,216	10.2	6.3

Source: U.S. Department of Commerce, Bureau of Economics Analysis
(Washington, DC).

Franklin County, in 1989, there is a significant portion of personal income that is generated outside the county of residence (\$25,225 and \$24,032 respectively). Personal income generated outside the county of residence has remained relatively constant over the 1984-1989 time period while personal income generated within the two counties has grown significantly. However, it may indicate a lack of employment opportunities within these counties. The other significant point concerning income is the high percentage of personal income which is in the form of transfer payments. Transfer payments as a percent of total personal income in 1989 were: Logan County, 25.5; Yell County, 22.8; Johnson County, 26.3; Franklin County, 22.4; and Scott County, 21.4. This is reflective of two elements: transfer payments to help alleviate poverty, and transfer payments for social security and government retirement pensions. Either way, transfer payments are made for non-current production. All five counties are above the State and national figures for transfer payments as a percent of total personal income.

Earnings by type and earnings by industry for the five counties are presented in Tables E.11 to E.15 (Appendix E). Farm income is probably lower than expected for this type of region. The earnings from retail trade are much lower than expected and also exhibit a much lower growth rate. This is reflective of the retail and service sales that rural areas are losing to the more urban areas. This loss is an ongoing concern of most small communities and rural areas in general.

For 1987, retail sales per capita for the individual counties were: Logan County, \$3,179; Yell County, \$2,379; Franklin County, \$2,266; Johnson County, \$3,974; and Scott County, \$2,617. The figure for the State of Arkansas was \$4,870 for 1987, so it can be seen that the study area does not generate the same sales per capita as the rest of the general population.

3.11.4 Earnings

Between 1985 and 1990 the total earnings and average weekly earnings increased slightly for Logan County and Yell County. As can be seen in Tables E.16 through E.20 (Appendix E), the increases in average weekly earnings were not consistent over all the counties being studied. Except for Scott County, much of the increase was attributed to the growth in manufacturing. Logan County experienced an actual decline in average weekly earnings for non-manufacturing employment for the 1985-1990 time period. All the other counties except Scott experienced increases in both manufacturing and non-manufacturing earnings. The lack of any employment in certain categories was noticeable as was the low average weekly earnings. In 1990, the highest average weekly earnings in manufacturing employment was in Logan County (\$313.88), yet this was only 90 percent of the State average. Weekly earnings in manufacturing employment in the other four counties were lower. In the State of Arkansas, the average weekly wage in 1990 in construction was \$380.72; in transportation and public utilities, it was \$485.98; and in finance, insurance, and real estate, it was \$418.76. None of the five study counties came close to these earnings for 1990.

3.11.5 Labor Force

Table 3.12 presents labor force characteristics. It should be noted that both Logan and Yell Counties had labor force participation rates in 1980 of less than 50 percent, as compared to the State of Arkansas with 55.8 percent. Labor force participation in the Counties of Franklin, Johnson, and Scott were about the same as in Logan and Yell. The number of

Table 3.12. Labor force characteristics, 1980.

	Persons 16 Years & Over	Labor Force	Labor Force Participation Rate	Employed	Unemployed	Not in Labor Force
Primary Employment Counties						
Logan	15,075	7,402	49.1	6,802	578	7,673
Yell	12,977	6,479	49.9	6,101	376	6,498
Secondary Employment Counties						
Franklin	11,147	5,887	52.8	5,182	705	5,260
Johnson	13,269	6,522	49.2	6,005	511	6,747
Scott	7,331	3,676	50.1	3,333	335	3,655
State of Arkansas	1,702,723	950,930	55.8	876,733	65,147	751,793

Source: U.S. Department of Commerce, Bureau of Census, 1980 Census of Population.

individuals choosing not to participate in the labor force seems relatively high when compared to the age make-up of the population (Section 3.11.2). In other words, the labor force participation rate within the five county area is lower than expected. One explanation would be a higher than average birth rate that is keeping a higher than average number of people remaining at home in a houseperson role. This explanation is not supported by the population data. A more plausible explanation would be the "discouraged worker" hypothesis. This explanation is based upon the idea that people do not participate in the labor force because they do not believe employment opportunities are available. The conclusion is that if there were more jobs available there would be more people attempting to work.

Tables 3.13 and 3.14 present the industry of employed persons. As would be expected, a higher percentage of individuals in the five counties are employed in agriculture than for the State of Arkansas, in general; the percentage, however, is still probably lower than expected, given the rural nature of the five counties. Forestry also seems much lower than expected given the terrain. Manufacturing compares favorably while transportation, communications, and public utilities; wholesale and retail trade; and finance, insurance, and real estate lag behind the State figures.

3.11.6 Unemployment and Commuting Patterns

As mentioned in the previous section, the labor force participation rates are below the State and national rates. The discouraged worker hypothesis was advanced as an explanation. This explanation is consistent with high unemployment rates. As can be seen in Table 3.15, such may not totally be the case. It should be noted, as shown on Figure 3.5, that the unemployment rate for Logan County ran higher than the State and the nation for 1980 - 1989 and dropped below the State rate only for 1990. Yell County unemployment rates ran consistently below the State and national rates for the decade. Scott County was usually below the State and nation's unemployment rates. The unemployment rates for Franklin and Johnson Counties were consistently higher. These unemployment rates could still support the discouraged worker hypothesis.

Table 3.16 presents the commuting patterns for the primary employment Counties of Logan and Yell as well as for the secondary employment Counties of Franklin, Johnson, and Scott. This table may be the most revealing of the overall economic health of the study area. For example, for Logan County it can be seen that 1,302 persons (19.6 percent) worked outside of the County. Even more important, 1,006 people (15.1 percent) had to commute more than 45 minutes to get to their place of employment. In fact, the mean commuting time for these workers was 61.5 minutes. For Yell County the pattern is similar, with 29.9 percent of the work force commuting to work outside of Yell County. Over 10 percent had to commute over 45 minutes with a mean travel time of 63.4 minutes.

The data for the secondary employment counties was similar although not quite as severe. A summary of the commuting patterns would be reflective of an area of relatively low employment opportunities. To obtain employment, a potential worker is faced with leaving the county of residence and seeking employment opportunities elsewhere. The percent of workers commuting more than one hour to their place of employment is high.

Table 3.13. Industry of employed persons, 1980.

	Primary Employment Counties			Secondary Employment Counties			State of Arkansas
	Logan	Yell		Franklin	Johnson	Scott	
Employed Persons	6,802	6,101		5,182	6,005	3,333	875,733
Agriculture	702	693		547	342	352	50,616
Forestry and Fisheries	57	32		62	26	42	2,336
Mining	252	15		175	68	18	6,260
Construction	543	452		460	415	253	61,276
Durable Goods Manufacturing	901	649		588	1,462	717	122,998
Nondurable Goods Manufacturing	979	1,194		692	758	423	96,722
Transportation, Communications, & Other Public Utilities	328	412		380	338	128	62,015
Wholesale and Retail Trade	1,160	964		800	888	572	173,444
Finance, Insurance, and Real Estate	142	197		183	107	80	37,305
Services	1,514	1,300		1,115	1,418	628	227,965
Administration	224	193		180	183	120	34,796

Source: U.S. Department of Commerce, Bureau of Census, 1980 Census of Population.

Table 3.14. Industry of employed persons, 1980 (in percentages).

	Primary Employment Counties			Secondary Employment Counties			State of Arkansas
	Logan	Yell		Franklin	Johnson	Scott	
Employed Persons	100.0	100.0		100.0	100.0	100.0	100.0
Agriculture	10.3	11.3		10.6	5.7	10.6	5.8
Forestry and Fisheries	0.8	0.5		1.2	0.4	1.3	0.3
Mining	3.7	0.2		3.4	1.1	0.5	0.7
Construction	7.9	7.4		8.9	6.9	7.6	7.0
Durable Goods Manufacturing	13.2	10.6		11.3	24.3	21.5	14.0
Nondurable Goods Manufacturing	14.4	19.6		13.4	12.6	12.7	11.0
Transportation, Communications, & Other Public Utilities	4.8	6.8		7.3	5.6	3.8	7.1
Wholesale and Retail Trade	17.1	15.8		15.4	14.8	17.2	19.8
Finance, Insurance, and Real Estate	2.1	3.2		3.5	1.8	2.4	4.3
Services	22.6	21.3		21.5	23.6	18.8	26.0
Administration	3.3	3.2		3.5	3.0	3.6	4.0

Source: U.S. Department of Commerce, Bureau of Census, 1980 Census of Population.

Table 3.15. Percent unemployment rates 1980-1990.

Year	Primary Employment Counties		Entry Point Counties			State of Arkansas	United States
	Logan	Yell	Franklin	Johnson	Scott		
1980	8.8	6.9	8.7	8.7	9.0	7.6	7.1
1981	10.1	7.5	10.5	8.8	10.6	9.1	7.6
1982	10.9	8.3	10.9	11.1	10.7	9.8	9.7
1983	11.7	7.9	11.6	9.8	8.8	10.1	9.6
1984	8.6	7.4	10.6	10.0	6.8	8.9	7.5
1985	10.9	7.0	10.8	9.9	5.4	8.7	7.2
1986	10.7	6.8	10.8	13.7	4.5	8.7	7.0
1987	10.7	5.8	10.0	14.3	4.3	8.1	6.2
1988	7.8	5.8	10.5	11.0	4.8	7.7	5.5
1989	7.7	5.2	9.8	9.3	5.8	7.2	5.3
1990	6.1	5.4	9.2	8.7	5.8	6.9	5.5

Source: Arkansas Department of Labor, Employment Security Division, Arkansas Labor Force Statistics, Annual Averages 1980-1990, May 1991.

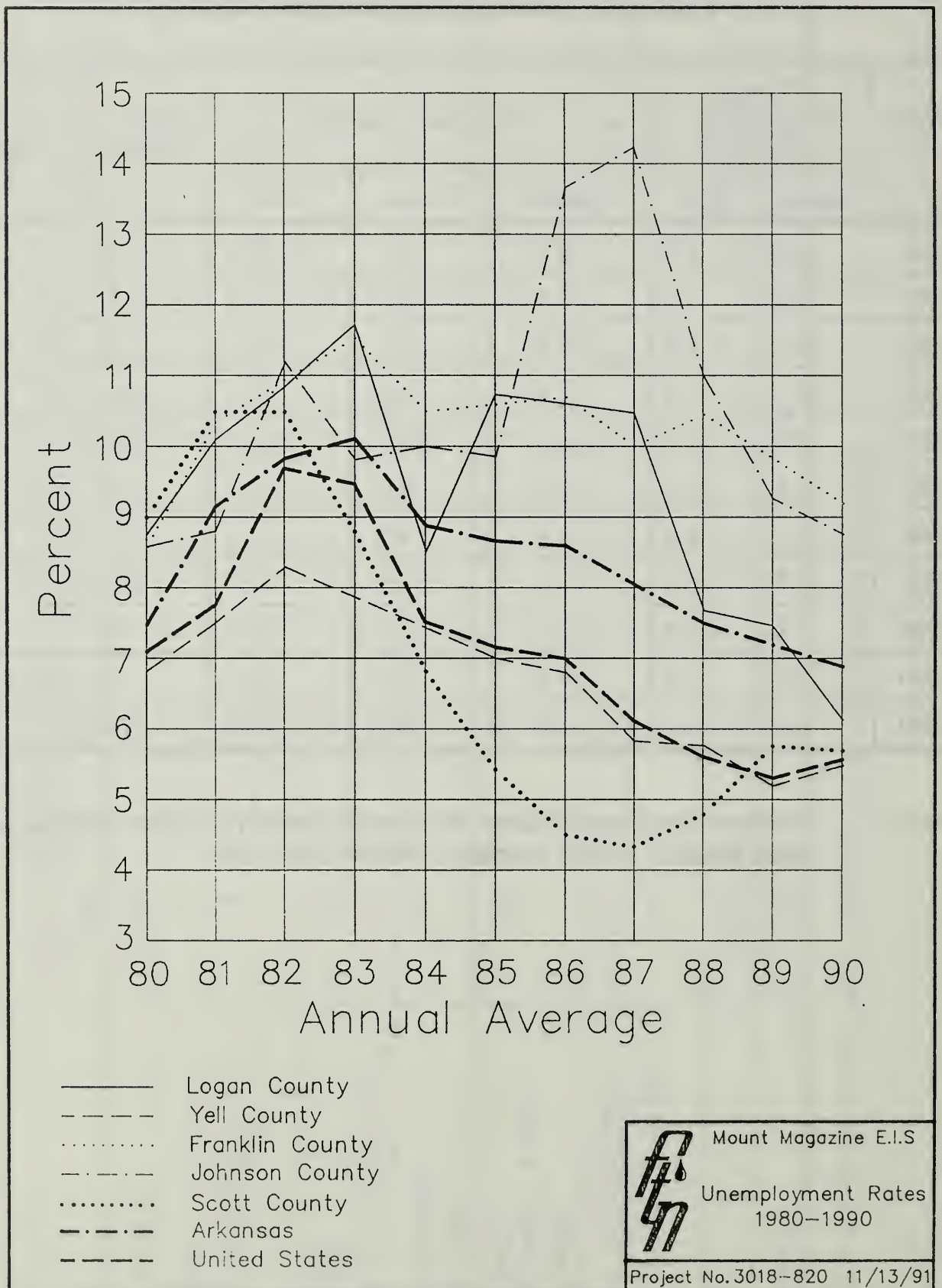


Figure 3.5. Unemployment rates, 1980-1990.

Table 3.16. Workers' commuting patterns, 1980.

	Primary Employment Counties				Entry Point Counties					
	Logan	%	Yell	%	Franklin	%	Johnson	%	Scott	%
All Workers	6,644	100.0	5,777	100.0	5,230	100.0	5,977	100.0	3,096	100.0
Working in County	4,841	72.9	3,768	65.2	3,462	66.2	4,930	82.5	2,356	76.1
Working Outside County	1,302	19.6	1,728	29.9	1,436	27.5	716	12.0	544	17.6
Place of Work Not Reported	501	7.5	281	4.9	332	6.3	331	5.5	196	6.3
Travel Time 45 Min. or More*	1,006	15.1	596	10.3	839	16.0	441	7.4	559	18.1
*Mean of: (in minute)	61.5		63.4		54.4		64.7		61.3	

Source: U.S. Department of Commerce, Bureau of Census, 1980 Census of Population.

3.12 Opportunities for Public Use

Mt. Magazine has numerous existing engineered structures in the project area including a State highway, improved Forest Development Roads, unimproved Forest Development Roads, a series of communication towers and facilities, a campground, four picnic areas, eight scenic overlooks, power lines, and communication lines. The old lodge site on the south side of the Mountain also provides a spectacular view of Blue Mountain Lake below.

Daytime recreational activities include picnicking, birdwatching, photography, rock climbing, hang gliding, horseback riding, hiking, and hunting. Possibly the most popular activity is touring the Mountain by car. Scenic overlooks on the north rim provide spectacular views of the valley below. Highway 309 was recently designated as U.S. Forest Service Scenic Byway. Although Mt. Magazine is a popular recreation spot for daytime use, overnight camping is provided by a U.S. Forest Service level 3 campground at the Cameron Bluff Campground. This campground can reach capacity during spring and summer holiday weekends, but is not heavily used otherwise. Stargazing also takes place on the Mountain at night; however, no astronomical groups routinely use the Mountain.

Rock climbing takes place on the south side of the Mountain below the old lodge site. Some rock climbing occurs on the northern cliff faces, but this location is not encouraged by skilled rock climbers because of the unstable rock face and high safety hazards associated with the unstable cliffs. The south slope of Mt. Magazine is also a prime hang gliding location because Mt. Magazine is much taller than other Arkansas sites (2,000 ft versus 350-700 ft). Mt. Magazine is used by both in-state and out-of-state pilots for hang gliding. Pilots have come from as far as Memphis to hang glide off the Mountain. The camp units, paved roads up the Mountain, and proximity to both Cove Lake and Blue Mountain Lake, also contribute to make Mt. Magazine an especially amenable hang gliding site (Fritschie, personal communication 1979). A launch site for hang gliders has been established near an old cabin site east of the old lodge site. Here, the hang gliders have set up wind socks for improved safety, and put in a sand box and a swing for their children.

The quarry site on Mt. Magazine is also the terminating point for one portion of trails use by Arkansas Trail Riders Association for horseback riding. In the past, this Association has held a use permit from the U.S. Forest Service for horseback riding along the old Will Apples Road immediately north and west of the quarry site on the northeast end of the Mountain.

Approximately 5 miles of hiking trails exist on the Mountain and traverse a variety of terrains. These trails link up with other trails on the north side of the Mountain (i.e., trail to Cove Lake).

Much squirrel hunting and some deer hunting takes place on top of the Mountain, although most hunting takes place on the Mountain's slopes. Several deer stands have been erected in wooded areas along the blufflines and ridges of the Mountain.

3.13 Aesthetics

As with any tourist attraction, the aesthetics of Mt. Magazine are an important element of the experience. The grand views from the Mountain are one of the main reasons people come to Mt. Magazine. From the south rim, the landscape unfolds below in a patchwork of farm fields. In the distance, Blue Mountain Lake is often visible. The north rim provides a view of the Boston Mountains and farmland. The top of the Mountain is a popular vantage for fall

foliage viewing. The visual quality of the Mountain area itself is sometimes compromised because of trash scattered about; vandalism is fairly common. Some visual intrusions currently exist on the Mountain including the radio towers located on the west end of the Mountain and the power line corridor on the south side of the Mountain. The radio towers can be seen from certain vantage points on both the northern and southern bluffs. The power line corridor can be seen from certain locations on the south side of the mountaintop.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter evaluates, and where possible quantifies, the effects of the proposed alternative actions on the affected environment of Mt. Magazine. The proposed alternatives include a No Action, No Change Alternative and four development alternatives that include construction and management of a lodge, cabins, visitor information center, water line, sewage treatment facility, access roads, toilets, employee residences, and a maintenance building. Under development Alternatives C, D and E, two proposed sites for the construction of the lodge, cabins and associated facilities were considered. The two alternative locations are the "old lodge site" on the south side of the Mountain and a site overlooking Bear Hollow east of Grainfield Picnic Area.

For each development alternative, the direct, indirect, and cumulative effects from construction activities (e.g., clearing, grading, building, heavy equipment traffic), and from operation and maintenance activities (e.g., on-site enforcement; restricted use areas; species monitoring; and maintenance of structures, equipment, and roads) are addressed. These activities are summarized in Table 1.1. The information presented in this chapter forms the basis for the scientific comparison and evaluation of the alternatives in Chapter 2.0. In this chapter, the environmental consequences associated with each alternative are discussed by individual resource component. Potential effects that are unavoidable and irreversible/irretrievable effects are identified and appropriate mitigation measures are presented.

A Biological Assessment and Evaluation (BA/BE) was prepared by the U.S. Forest Service (USDA Forest Service 1993). The BA/BE was signed on February 3, 1993, and concludes that the No Action, No Change Alternative (Alternative A) would benefit most plant species but would reduce or potentially eliminate habitat for species which require open habitat. With Alternatives B-E (Action Alternatives), no significant losses of sensitive plant habitat would occur with the exception of broom nailwort, and mitigation measures mentioned in the EIS can greatly reduce the negative effects of trampling and disturbance. Alternative E calls for the most development and likely the most disturbance. Alternative D would limit the size of facilities relative to Alternative E, and should not significantly affect any species with the addition of described mitigation measures for the rufous-crowned sparrow. Mitigation measures for the rufous-crowned sparrow may alleviate, to some degree, loss of habitat and it is possible the net effect may be beneficial as a result of habitat enhancement and monitoring (USDA Forest Service 1993).

Spears Professional Environmental and Archeological Research Service, Inc. (SPEARS) conducted a cultural resources assessment of the proposed state park on Mt. Magazine. The study, which is part of this EIS, included a literature search for information on the archeological and historic sites on the Mountain and an archeological survey of selected development areas. About 60 archeological sites were identified in the literature search. Thirteen archeological sites were found in the development areas surveyed. Twelve of these sites are considered potentially eligible for inclusion in the National Register of Historic Places.

Table 3.6 lists all known archeological sites on the Mountain and indicates those which could potentially be affected by the various development alternatives. Table 2.3 indicates the number of sites which could be affected under each alternative. The consequences of

implementation of each development alternative on historic properties, as well as proposed measures to mitigate adverse effects, are presented in this section (4.0) of the FEIS.

Detailed information regarding the SPEARS study is presented in SPEARS Project Report 49, entitled *A Cultural Resources Assessment and Archeological Survey of Selected Areas of the Proposed State Park on Mt. Magazine, Logan County, Arkansas*. The State Historic Preservation Officer (SHPO) was afforded the opportunity to review a copy of Report 49 and this EIS. On February 5, 1993, the SHPO concurred with the survey methods, report documentation, and proposed mitigation measures. A copy of the letter of concurrence is included in Appendix H of this document.

4.2 Alternative A (No Action, No Change)

Alternative A is the No Action, No Change Alternative. Under this alternative, the U.S. Forest Service would continue to manage Mt. Magazine as described in Chapter 2.0. In general, less energy is consumed under the No Action, No Change Alternative; fewer human, material, and economic resource requirements are associated with this alternative. The No Action, No Change Alternative has no construction-related effects and results in the least amount of irreversible and irretrievable commitment of land, water, and air resources of the five alternatives. In contrast, however, there are potentially greater effects on certain resource components as a result of limited control and regulation of visitation on the Mountain under this alternative.

4.2.1 Soil, Water, and Air

There should be no effects on soil, water, and air resources under the No Action, No Change Alternative.

4.2.2 Vegetation

Analysis of the direct effects of each alternative on the vegetation of Mt. Magazine is based on the type and amount of a particular plant community disturbed, lost, or protected. Indirect effects on the vegetation of Mt. Magazine are based on secondary or indirect changes to habitat (e.g., sedimentation, soil erosion, changes in moisture regime) that alter plant community distribution and species composition.

Environmental consequences to the vegetation on Mt. Magazine under this alternative are attributable to two factors: natural succession, and recreational use outside of designated areas due to limited visitor control and regulation. The environmental benefits of this alternative are attributable to the low visitation rates that occur under this alternative (see Section 4.2.8). The environmental consequences and benefits of Alternative A are discussed in more detail below.

Natural Succession

Natural successional processes will continue under the No Action, No Change Alternative as well as the other alternatives. Without considerable resources for vegetation and habitat management, it is likely that natural succession will have the following effects under Alternative A: (1) loss of prairie or glade-like openings or clearings in the juniper-hardwood woodlands; (2) loss of openings in the scrub oak woodlands; (3) loss of sphagnum seep communities; and (4) subsequent loss of some special status species occurring in these communities. While species

and habitat management currently are ongoing efforts by the U.S. Forest Service under the No Action, No Change Alternative, the U.S. Forest Service traditionally does not have the financial resources available to manage or maintain all species and habitats of an area. Consequently, management efforts are often prioritized for the most sensitive species and cannot provide full protection to the diverse number of communities, species, and habitats that may require protection.

Visitation and Use

Under this alternative, recreational use outside of designated areas, and limited control and regulation of visitation to the Mountain, will affect a few specific plant communities and special status species. Some of the more sensitive plant communities (based on their distribution on the Mountain and on the number of special status plant species within these communities) are located in or directly adjacent to areas that currently receive most of the visitation. Specific sensitive areas that currently receive the heaviest visitation under this alternative are: (1) the small sphagnum seep community at Dripping Springs; (2) the mesic bluffline communities on the north side, particularly those having wet substrate because of seepage (e.g., Brown Springs); and (3) bluffline communities on the south side of the Mountain.

During field surveys in 1991, observations were made of many visitors on the rock outcrops outside of the designated picnic and recreational areas on the Mountain. Unauthorized trails have been developed to the west of Brown Springs extending to the Dripping Springs area and out to the bluffs and rock outcrops that contain habitat for several special status species. Evidence of foot and horse traffic was easily identifiable at Dripping Springs. Day-use visitors routinely investigate the seeps and springs along the northern bluff at Brown Springs and descend the steep slopes in the vicinity of the springs. Because of the steepness of this slope, the rough terrain, and wet conditions of the spring, this area is difficult to traverse without disturbing the plants and habitat. Evidence was noted of uprooted vegetation, loss of soil and rock substrate, species trampling, and overall habitat destruction for the numerous moss, fern, and other herbaceous species that are abundant in this area. Both mosses and ferns and other species of special concern in both the Dripping Springs and Brown Springs areas cannot withstand continuous trampling and heavy foot traffic. While many of these effects will be seasonal, the long-term effects on these communities and species may result in species elimination or displacement. For some sensitive species these effects may be irreversible and irretrievable. Additionally, Highway 309 has recently been designated a U.S. Forest Service Scenic Byway. It is expected that current levels of visitation to the Mountain will increase as a result of this designation. As visitation to the Mountain increases, effects on these plant communities described above and on some of the sensitive species of these communities are likely to increase.

Other plant communities currently affected by the limited control and visitor regulation on the Mountain under this alternative include the bluffline communities on the south side of the Mountain. During field surveys of the Mountain in 1991, overnight campers were routinely observed on the south side of the Mountain outside of the designated campground at Cameron Bluff, and evidence of fresh fire rings was noted at the old cabin sites. Under Alternative A, activities such as those described above are expected to continue. Continued use of these sites may result in trampling of the more sensitive herbaceous species such as broom nailwort (*Paronychia virginica* var. *scoparia*). However, because visitation to the Mountain is not

expected to be significantly increased under this alternative, the continued existence of many of the non-sensitive bluffline species most likely will occur. The presence of weedy and invasive species that can more readily tolerate disturbed conditions because of their reproductive, dispersal, and life history strategies may increase over current levels in the more heavily utilized areas; and an increase in the displacement of the native vegetation over current conditions may occur under Alternative A.

Additional consequences to plant communities on the south blufflines from limited visitor control and regulation under this alternative may occur from escaped campfires. During the summer, Mt. Magazine (particularly the south side of the Mountain) is extremely dry and has a high fire risk. Some communities, such as the prairie-like openings in the plant communities on the south side, are fire-adapted communities that, like similar communities of the West and Southwest, often need fire for their continued survival. Escaped fires combined with a lack of readily available fire control measures (i.e., one hour response time by the U.S. Forest Service), however, typically will not restrict fire to these communities and may affect other communities on the Mountain. During the summer of 1991, for example, a portion of the prairie opening in the juniper-hardwood woodland and the xeric oak-hickory forest, near an old cabin site on the south side of the Mountain, was burned as a result of an escaped campfire in an undesignated camping area. Such direct effects resulting from limited visitor control and regulation have the potential to cause losses of high quality mesic oak-hickory forests, other mesic-to-wet communities, and many of the special status species found in these communities. Unusual, stunted post oak and blackjack oak plants in the xeric scrub oak community that are very old (Tucker 1990a), and juniper-hardwood woodland communities on the south side of the Mountain, could also be affected.

Other effects of limited visitor control and regulation under this alternative include the indiscriminant collection of plants from the Mountain. While the U.S. Forest Service regulates its lands through a permit system, unauthorized collection of plant specimens on the Mountain routinely occurs. Visitors are often drawn to collect wildflowers while visiting the Mountain, particularly because many of the areas support a diverse number of brilliantly colorful plants. For example, visitors were seen collecting daffodil bulbs from areas on the Mountain during the Spring of 1991. Some of the particularly showy species, such as Turk's-cap lily (*Lilium superbum*), may be liable to transplanting by the overzealous wildflower gardener. Also, Tucker (1972) noted "bouquets of plants" left aside in some of the more sensitive areas. Reports also exist of the collection of natural herbs, including ginseng (*Panax quinquefolia*), from the Mountain (Tucker 1976). While ginseng collection on the Mountain was authorized through 1990 (approximately 10-15 permits issued by the U.S. Forest Service per year), no collection limits were required or could be enforced.

Under this alternative it is not expected that unauthorized collection of species during a single event will decimate populations on the Mountain. Long-term effects of repeated collections, however, could decrease population numbers to below a critical size that is necessary for the continued survival of the population and/or species.

Some of the effects on the vegetation on Mt. Magazine as described above may result in an irretrievable loss of some unique vegetation elements of the Mountain. Most of the effects, with the exception of fire, will most likely result from natural processes and visitor activities occurring over multiple years. All of these effects are avoidable or can be minimized with

improved visitor control (e.g., fencing, signing), restricted access, increased management and enforcement, routine habitat and species management, and increased visitor education of the Mountain's resources. However, these types of protection measures will most likely not be implemented under the No Action, No Change Alternative.

4.2.3 Wetlands

Several small seasonal wetlands have the potential to remain under the No-Action Alternative. In some cases, however, plant succession may result in a change in hydrophytic species composition. In some cases, the encroachment of woody vegetation may make them dry for longer periods of time. No effects on permanent wetlands are likely to occur.

4.2.4 Wildlife (Vertebrates)

No effects on the vertebrate community are likely to occur under this alternative due to low visitation rate of Alternative A.

4.2.5 Wildlife (Invertebrates)

The No Action, No Change Alternative contains no restricted use area as do Alternatives B through E. There is obvious evidence that visitors do not confine themselves to developed areas. However, with the low visitation, there should not be any effects on the invertebrate communities on the Mountain.

4.2.6 Proposed, Endangered, Threatened and Sensitive (PETS) Species

4.2.6.1 Plants

Most of the plant species on the U.S. Forest Service PETS list are associated with mesic communities having light to heavy shade. Most appear to have a close affinity with the heavy shade conditions associated with more mature forest communities. The No Action, No Change Alternative, therefore, will favor the continued existence of most of the species on the list because no effects on these habitat types will occur. Species that would probably be favored by Alternative A include: Fibrous-root sedge (*Carex communis*), Pennsylvania sedge (*Carex pennsylvanica*), Ozark chinquapin (*Castanea pumila* var. *ozarkensis*), Eastern hay-scented fern (*Dennstaedtia punctilobula*), spinulose wood fern (*Dryopteris spinulosa*), Western wall flower (*Erysimum capitatum*), Turk's-cap lily (*Lilium superbum*), maple-leaf oak (*Quercus shumardii* var. *acerifolia*), prickly gooseberry (*Ribes cynosbati*), Wood stonecrop (*Sedum ternatum*), Epling's wood nettle (*Stachys eplingii*), Ozark spiderwort (*Tradescantia ozarkana*), and Wood's false hellebore (*Veratrum woodii*).

The No Action, No Change Alternative would certainly promote the continued survival of existing maple-leaf oak populations on the Mountain. There is some evidence, however, that this small oak may have a fire-related ecology (Hess and Stoyloff 1990), such that fire (or some other management tool) would be necessary to promote seedling establishment in the species. No additional negative effects on the maple-leaf oak are expected under Alternative A with the possible exception of collection and removal of acorns from the Mountain. Researchers have collected acorns in large numbers in the past. With the discovery of additional populations of this oak elsewhere in 1991 (Shepherd, personal communication 1991), concern for the strict protection of this particular population and habitat has lessened.

Several of the PETS species are apparently dependent on open, well-lit habitat if viability is to be maintained. These species would include Ouachita leadplant (*Amorpha ouachitensis*), Bush's poppy mallow (*Callirhoe papaver* var. *Bushii*), small-headed pipewort (*Eriocaulon kornickianum*), soapwort gentian (*Gentiana saponaria*), broom nailwort (*Paronychia virginica* var. *scoparia*), and Rocky Mountain woodsia (*Woodsia scopulina* var. *appalachiana*). On Mt. Magazine there are sufficient areas of rock outcrop and thin soils to which three of these species, Ouachita leadplant, broom nailwort, and Rocky Mountain woodsia, are adapted that would prevent their loss through plant succession. Exceptions are Bush's poppy mallow and small-headed pipewort, both of which were known historically from the Mountain but which apparently have been extirpated, in both cases probably through natural plant successional processes. A third exception would be soapwort gentian, a species associated with sunlit sphagnum seeps that have the potential to develop a closed canopy via natural succession, thereby shading out the species. Without vegetation management in this community, it is likely this species will be extirpated.

Limited visitor control and regulation under this alternative may affect broom nailwort, a PETS species found on the rock outcrops on the south side of the Mountain. Under the No Action, No Change Alternative, broom nailwort is subject to possible extirpation as a result of continuous trampling year after year. For these reasons Alternative A, on a long-term basis, would probably be detrimental to only four species on the PETS species list: Bush's poppy mallow, small-headed pipewort, soapwort gentian, and broom nailwort, two of which probably have been lost already due to normal successional trends.

4.2.6.2 Wildlife (Vertebrates)

The single PETS vertebrate species which may be directly effected by Alternative A is the rufous-crowned sparrow (*Aimophila ruficeps*). This sparrow inhabits the glade communities of the southwest escarpments. Although the current status of this population is not fully known, the No Action, No Change Alternative is beneficial to this species because visitation rates will remain low and visitor activity in the area in which the critical habitat for this species is found will continue to be limited. With the discovery of additional populations of this species elsewhere in Arkansas, concern for absolute protection of the Mt. Magazine population has been moderated. While the No Action, No Change Alternative should not be detrimental to the rufous-crowned sparrow, habitat monitoring and improvements are limited, which could affect the long-term existence of this PETS species on the Mountain.

4.2.6.3 Wildlife (Invertebrates)

Under the No Action, No Change Alternative there are essentially no identified effects on known populations of invertebrate PETS species. The only possible exceptions might be potentially deleterious effects on the viability of existing populations from unlimited and unregulated collection of insects and other invertebrates for scientific and other purposes. One species, the Diana fritillary (*Speyeria diana*), was once abundant on the Mountain. Recent attempts to document this species on the Mountain have resulted in the documentation of six individuals. Concern exists that this species may have been overcollected and also that routine roadside maintenance (i.e., mowing) during the flowering of this species host plant may have

significantly affected the population size of this butterfly. Under this alternative, roadside maintenance schedules can be modified to mitigate effects on this species, but unregulated collection is likely to continue.

The Magazine Mountain shagreen (*Mesodon magazinensis*) is not known from within the affected area and it is unlikely that any detrimental direct or indirect effects on this species should occur under Alternative A.

4.2.7 Cultural Resources

There are no direct effects of the No Action, No Change Alternative on the cultural resources on Mt. Magazine. The effects of Alternative A on cultural resources, however, would continue to be indirect. The archeological sites and historic properties may be disturbed by visitors through vandalism and non-scientific collecting. The standing structures will continue to decay naturally from disuse and lack of maintenance. The loss of these resources can be avoided or minimized under this alternative via the management of all significant sites and properties by the U. S. Forest Service according to U.S. Forest Service guidelines. It is unlikely, however, that resources and efforts to protect these resources will increase beyond the current level already provided for under this alternative.

4.2.8 Socioeconomics

The economic base for Mt. Magazine was provided in Chapter 3.0. Research on the social and economic characteristics of the primary impact area revealed that Logan and Yell Counties are not expected to grow significantly in population, income, earnings, or labor force during the future. Employment opportunities are not expected to expand in the future, and unemployment rates should increase unless the residents continue to commute sizeable distances to find employment. Agricultural endeavors, such as a continuation of the emphasis on broiler production, remain a possibility for income. Overall, a projected population decrease is expected for Logan County, and a slight increase is expected for Yell County. Emigration from the area continues, and the population is aging. Low or no growth population projections for the two-county area are expected to occur under this alternative.

The average estimated range of visitors to Mt. Magazine under this alternative is 43,000 to 50,000 annually. Annual operation and maintenance costs for this alternative are expected to be \$30,000 (see Appendix F: Part III).

4.2.9 Opportunities for Public Use

Diverse recreational opportunities are available with the No Action, No Change Alternative. Hang gliding, rock climbing, hiking, horseback riding, camping, picture taking, bird watching, picnicking, site-seeing by car, and educational study are currently enjoyed by visitors to Mt. Magazine. Because Mt. Magazine is not as well developed as other Arkansas mountaintop parks (e.g., White Rock Mountain, Mt. Nebo, Petit Jean Mountain, and Queen Wilhelmina), Alternative A allows the visitor to enjoy a more primitive experience. The No Action, No Change Alternative, with no new development, would continue to make the mountaintop suitable for astronomic observations, an activity in which local residents have expressed interest. Educational opportunities under this alternative would only be available to

organized groups having their own agenda and to researchers who study the Mountain's unique features. The full educational potential of Mt. Magazine will not be realized under this alternative.

As discussed in Chapter 3.0, the slopes surrounding the Mountain range from steep to precipitous, often breaking off into sheer cliffs, especially on the Mountain's north face. The cliff face can be very unstable and hazardous for recreational activities such as rock climbing. Day-use visitors also explore these bluffs. Limited visitor protection from safety hazards is provided under this alternative. Sanitary facilities are unavailable at some recreational areas on the Mountain under this alternative.

4.2.10 Aesthetics

Aesthetics, or visual quality, is one of the Mountain's principal attractions; however, unregulated visitation has resulted in vandalism and improper trash disposal, both of which detract from the aesthetic value of Mt. Magazine. These practices are unlikely to change under this alternative.

4.3 Alternative B

In addition to operation of the existing facilities, Alternative B includes construction and operation of two additional toilets, an 18-20 room lodge, 18 cabins, an amphitheater, a visitor information center, 3 employee residences, and a maintenance building. Approximately 20 full-time employees and 7 state-owned vehicles are needed to manage, operate, and maintain the proposed state park under this alternative. The alternative lodge site was not addressed under this alternative, as development under this alternative is proposed to provide the historical perspective.

4.3.1 Soil, Water, and Air

4.3.1.1 Soil

Construction of recreation facilities and utility lines under Alternative B would eliminate existing ground cover and result in either displacement or compaction of soils in the construction and staging areas. The total acreage that will be cleared, graded, subjected to heavy equipment traffic during construction, and landscaped is estimated to be 13.6 acres. Approximately 10.3 acres will be effected for the improvement of existing construction of new roads (Appendix F). The majority of this acreage (approximately 7.5 acres) will be cleared for the construction of the water line access road. Where possible, existing road corridors will be utilized.

Possible indirect effects of construction activities are the changes in drainage patterns from grading, erosion, and sedimentation. The proposed locations for most facilities, however, are fairly flat or gently sloped; therefore, these indirect effects are expected to be temporary, minimal, and of little or no consequence. The water line, booster stations, and associated access road, however, will be constructed over rough, steep terrain (Figure 4.1). Erosion may be expected to occur during construction because of the steep slope. To minimize erosion, land disturbances should be kept to a minimum and restabilization scheduled as soon as practical.



Figure 4 1 Location of proposed water line, access roads, and water tower.

Soil Conservation Service standards and specifications for erosion and sediment control could be used for the design and construction of erosion and sediment control measures. Mitigation measures are discussed in greater detail in Section 4.7.

The Universal Soil Loss Equation (Corbitt 1990), which is used by various resource and regulatory agencies to model soil erosion, was used in the impact analysis to estimate the amount of soil loss as a result of development under this alternative. The total soil loss from the Mountain after development is completed under this alternative is expected to be approximately 294.2 tons per year. The average soil loss was estimated to be 5 tons per acre per year, an increase of 4.5 tons per acre per year over the average soil loss before development. Most of the soil loss is attributable to the water line access road. This rate of sediment loss is not expected to have long-term, cumulative downstream effects because the size of the affected area is relatively small compared to the size of the watersheds of the various receiving streams. Additionally, intervening forested areas will buffer streams from long-range transport of sediment. Effects can be further mitigated, for example, by grading and graveling access roads, using siltation fencing and hay bales to trap sediments, and establishing grassed waterways and ditches along the access roads.

During operation and management of recreation facilities, the use of unpaved Forest Development Road 1606 on the west end of Mt. Magazine will be limited. By restricting the use of this road, erosion and sedimentation are minimized in this hydrologically sensitive area. In addition, restricted use of the area west of Brown Springs will minimize the number of people exploring the bluffs and traversing the low, creeping slopes above the rock faces; therefore, there will be no effect on current rates of soil movement on these unstable slopes.

4.3.1.2 Water

The construction and on-going operation and maintenance activities under this alternative will result in increased stormwater runoff. Total increased storm flows were estimated to be approximately 19 cubic feet per second (cfs) by applying the Rational Method and assuming a 3.5 inch per hour storm, which is the 100 yr. design storm for the Mountain. This total flow from the affected area would be mixed with runoff from an even larger watershed area; therefore, the actual runoff from the affected area would result in an insignificant increase in flow in each discrete drainage, and no downstream cumulative effects over the long-term. Stormwater flows generated from the site will be managed in accordance with all applicable regulations.

Hydrocarbons and other compounds could be present in runoff from paved areas receiving vehicle traffic. The U.S. Environmental Protection Agency (EPA) conducted a national study of urban runoff and found a number of priority pollutants in stormwater (EPA, 1983). The U.S. Forest Service used the EPA data and applied it to an analysis of potential impacts from the existing road on Mt. Magazine upon the Magazine Mountain shagreen snail. Their calculations are based on the highest concentrations of constituents found in Little Rock, Arkansas, road runoff. This analysis demonstrated that road runoff mixed with runoff from the watershed area above the road diluted stormwater contaminants well below the State of Arkansas numeric water quality criteria for aquatic life. The EPA study was conducted in a large urban area where there are significant percentages of residential, commercial and mixed use areas and pavement, and where there is little opportunity for stormwater dilution from undeveloped areas.

In comparison, the proposed development on Mt. Magazine will result in far less vehicle traffic, and the affected area is small (less than 3 percent) in comparison to a total 2,200 acre mountaintop. Runoff from areas affected by development is expected to be diluted by at least a factor of ten in each drainage basin. Thus, no effects from chemicals in road runoff are expected.

The groundwater recharge area for known springs on the north side of the Mountain is located largely in the restricted area west of Brown Springs and will not be affected by development on Mt. Magazine. Reduction in recharge areas due to addition of impervious surface is less than 1 percent of the total available recharge area; therefore, reduction in recharge is expected to be minimal and of little or no consequence.

Construction of the water line and storage facilities will provide a year-round supply of water on the Mountain. It is anticipated the source of water will be the towns of Blue Mountain and Magazine. Officials from these towns have indicated there should be sufficient water supply to meet the needs of Mt. Magazine and their respective customers.

Mt. Magazine is subject to an increased number of ice storms during the winter months (see Chapter 3.0); therefore, during inclement weather, sand is used on roadways by the Arkansas Highway and Transportation Department. Effects of winter road maintenance on water quality are expected to be minimal and of little or no consequence.

The proposed toilets, which require no water or electric energy, would improve human waste disposal in recreation areas and provide for the protection of both human health and water quality.

Wastewater generated from the proposed package plant or wastewater treatment plant will be treated and released off the Mountain. Approximately 7,800 gallons per day of water would be treated and discharged to West Bass Creek on the south side of the Mountain. In order to avoid discharging treated wastewater into the Special Interest Area, effluent may be hard piped for discharge to the approximate 1,600 ft elevation. Although it is unclear whether this mitigation measure will be needed under this alternative, provisions for hard piping are included in the cost estimates (see Appendix F). The Arkansas Department of Parks and Tourism will apply for an National Pollutant Discharge Elimination System (NPDES) permit to operate a wastewater treatment plant. In addition, the treatment facility would be expected to produce effluent quality that will comply with the discharge permit conditions; however, effluent will be oxygen demanding and contain nutrients such as phosphorus and nitrogen. These nutrients most likely will promote the growth of vegetation in proximity to the outfall discharge pipe. However, no effects of these wastewater discharges on the downstream vegetation are anticipated.

4.3.1.3 Air

The proposed development should not degrade the ambient air quality and, therefore, should not effect human health, vegetation, wildlife and the environment in general. Dust may be raised during construction but can be controlled by spraying water on the soil and excavated material to keep it on the ground, graveling access roads, and covering soil and debris piled in open trucks.

Potential odors may arise from the wastewater treatment facility proposed under this alternative, even when operated properly. Mitigating measures that could be used to reduce odor

drift include use of a vegetated buffer zone around the wastewater treatment plant and locating the wastewater treatment facility away from high use areas.

4.3.2 Vegetation

4.3.2.1 Construction Effects

Visitor Information Center

Under Alternative B, a shortleaf pine community and mesic oak-hickory forest will be cleared for the construction of the visitor information center and associated structures. The mesic oak-hickory forest present in this area is in an earlier successional stage than those found at many other locations on the Mountain. At this location, neither the pine community nor the mesic oak-hickory forest exemplifies the original forest cover on Mt. Magazine; both types have low species diversity. Indirect effects on these plant communities and their component species from altered drainage patterns during construction will be short-term and are not expected to have an effect on the plant communities or species in this area.

The mesic bluffline and scrub oak communities on the ledges and outcrops near the bluffline should not be affected by the construction of the visitor information center and associated structures. No construction activities are designated in these communities. An approximate 1,000 ft wide vegetative buffer exists between these communities and the proposed area for construction of these facilities.

Lodge and Cabins

Construction of a lodge, cabins, and associated structures on the Mountain under Alternative B has the potential to affect several different plant communities. Plant communities that will be affected by construction at the old lodge site include xeric oak-hickory forest, juniper-hardwood woodlands, xeric sandstone community, and a small number of glade areas and prairie openings in the juniper-hardwood woodlands. While much of the construction activity at this site would take place in previously disturbed areas and in the locations of the old cabins and lodge, some new areas will be affected to construct up-to-date facilities for the operation and maintenance of a state park (e.g., wastewater treatment or package plant, larger parking areas, and access roads). Direct effects on portions of the juniper-hardwood woodlands and accompanying glade and prairie openings will be unavoidable under this alternative. Because of the limited distribution of this plant community, construction activities at this location will fragment and decrease the size of this already limited plant community. The juniper-hardwood woodlands and their associated openings are considered to be a unique feature on the Mountain, both floristically and because they provide habitat for the rufous-crowned sparrow, a sensitive species. Construction activities in this and in the xeric sandstone plant communities, particularly in areas where the old cabin sites are close to the bluffline, may affect outcrop species such as knotweed (*Polygonum tenue*), fame flower (*Talinum* spp.), and broom nailwort (*Paronychia virginica* var. *scoparia*), and fragile soil lichen species. Both direct (i.e., heavy equipment impacts) effects, which are unavoidable, and indirect effects, such as soil erosion, sedimentation, and changes in drainage patterns, could decrease the population sizes of these species and reduce the size of these already limited communities.

Additional concerns exist over the establishment of weedy and invasive species that may out-compete native and existing plant species as a result of construction. Evidence of this phenomenon can be seen at the hang gliding site, where much of the area has been cleared of vegetation for this recreational activity. Many colorful yet weedy and invasive species, such as false garlic (*Nothoscordum bivalve*), Venus looking glass (*Triodanis perfoliata*), spring beauty (*Claytonia virginica*), and chickweed (*Stellaria* sp.), can be found at this site. This site differs markedly from the other old cabin sites that have not experienced recent clearing and which do not receive extensive use.

While irreversible/irretrievable loss of portions of these communities will occur as a result of construction, it is generally thought that the effects on the juniper-hardwood woodlands and the bluffline xeric sandstone community can be reduced by conducting construction activities in previously developed areas. However, some impacts on undisturbed portions of these communities will be unavoidable.

Avoidance of areas containing special status species and unique components of these plant communities should be exercised whenever possible, and construction moved up on the slopes to the more xeric oak-hickory community. Habitat and species monitoring and protection should be implemented during construction activities.

Some unavoidable losses of the adjacent xeric oak-hickory community will also occur. Due to its widespread distribution on the Mountain, effects on this community as a whole should be negligible.

Water Line, Access Roads, and Water Storage Tower

Although the water line is proposed to be constructed in an existing power line corridor, removal of vegetation will be required along the entire route for the construction of the proposed water line and access roads. The amount of vegetation to be removed for the construction of the water line, however, is negligible compared to the amount present on the top and slopes of the Mountain. Additionally, the vegetation present within the power line corridor has been disturbed previously due to the construction and maintenance activities for the previous utilities.

While the vegetation of the corridor includes many species indicative of disturbed conditions, it retains elements of the adjacent plant communities found along the southern slopes and bluffs of the Mountain. At the higher elevations just above the bluffline, overstory tree species of the juniper-hardwood woodlands will be removed. On the steep upper slopes the overstory, shrub, and herbaceous elements of the xeric oak-hickory community will be removed during construction; however, these individuals generally are small in stature compared to the adjacent undisturbed community. Elements of mixed pine-hardwood forest type will be removed in the transitional zone between 1,600-2,000 ft with the majority of these species being hardwood species, unlike the mixed pine-hardwood community flanking the right of way. Below this elevation, shortleaf pine and associated herbaceous species will be removed. At the lower elevations below the pine community, some hydrophytic species (i.e., species tolerant of wet or moist soil conditions), including sweet gum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*), will be removed. While numerous elements of several plant community types will be removed for the construction of the proposed water line and access roads, effects on the surrounding plant communities should be negligible because the width of the power line corridor should allow dispersal through the corridor. The construction of access roads in some of the

adjacent plant communities, however, may result in the irreversible/irretrievable loss of large trees indicative of the original forests once present along the Mountain slopes and a small amount of juniper woodland with prairie-like openings at approximately 2,100 ft. The overall direct effects of the construction of new access roads, however, should be negligible.

Indirect effects on the adjacent plant communities and the communities at the lower elevations as a result of increased erosion, sedimentation, changes in drainage patterns, and volume of water should be small, with the possible exception of the wetland community at the lower elevations (See Section 4.3.3).

Effects of the construction of the water tower at the base of Signal Hill will be negligible since this construction will be completed in an area with existing structures (i.e., well house and concrete water storage tank) and which has been disturbed previously.

4.3.2.2 Effects of Operation and Maintenance

Facilities, Structures and Grounds

No additional effects on the vegetation at the lodge, cabins, visitor information center, water storage tower and other sites are expected as a result of structure, facility and landscape maintenance, and maintenance of utility right-of-way corridors. Vegetation management in these areas should conform to the "Final EIS for Vegetation Management in the Ozark-Ouachita Mountains" (USDA Forest Service 1990c), which contains guidelines considered to be environmentally acceptable for U.S. Forest Service lands. Adverse effects on vegetation from recreational activities are not expected to occur. Hang gliding on the Mountain will continue to occur at an old cabin site that has already been disturbed. Rock climbing will be restricted to the south bluffs. Usage is not expected to increase; therefore, unique species that inhabit the crevices of rock outcrops and bluffs on the south side of the Mountain should not be affected as a result of recreational use under this alternative.

Administrative Activities

Several administrative and park management activities that will take place under Alternative B (but that are not provided under Alternative A) will have beneficial effects on the long-term and continued maintenance of the flora of Mt. Magazine. These activities include: (1) restriction of access to the mesic oak-hickory community along Mossback Ridge, and to the mesic bluffline, sphagnum seeps, and the scrub oak woodland communities west of Brown Springs; (2) resident enforcement staff to enforce restricted access to these areas; (3) visitor educational and interpretive programs that will communicate the unique features of the Mountain and will educate visitors about the protection of plant communities and special status species; (4) a multiagency monitoring program to readily identify adverse effects on plant communities and special status species, and to develop species and habitat management programs; (5) on-site staff to implement species and habitat management programs; and (6) a permit distribution system for scientific study of elements on the Mountain. Restricted access will allow those most sensitive or important plant communities on the Mountain to remain in an undisturbed state. Because a permit system will be used to allow access into these areas on the top of the Mountain, sufficient undisturbed habitat should be available to maintain the diversity, richness, and health of the flora of the Mountain and of unique plant communities and their component species.

Similar to Alternative A, plant succession will continue to occur on the Mountain in specific communities (e.g., sphagnum seep community, prairie and glade openings in juniper-hardwood woodlands, and scrub-oak woodlands). Under Alternative B, however, species and habitat monitoring and management by the Arkansas Department of Parks and Tourism and other state and federal agencies are likely to increase, thus preventing loss of communities and their component species.

Park Use

During the operation of the proposed state park, the rate of use of the lodge, cabins, visitor information center and recreational sites will be variable through the year. Visitor use of these facilities and sites is expected to be greatest during the spring and fall when the temperatures are more amenable to recreational use of the Mountain. As the number of visitors to the Mountain increases, direct and indirect effects on the plant communities are also expected to increase. Based on the potential occupancy of the lodge, cabins, and campgrounds, and on the added educational activities, no long-term, irreversible, or irretrievable losses of plant communities should occur.

Increased foot traffic and trampling of bluffline communities is expected to increase over Alternative A. This increased foot traffic could result in the loss of some of the bluffline species and the displacement of these species with more opportunistic, weedy species. These effects can be minimized by visitor and pedestrian control at the lodge and cabins sites, and Brown Springs Picnic Area (e.g., fencing, signing), and by the implementation of protection measures such as adequate buffer zones around species and habitats.

Under Alternative B, increased use of the trails is likely to occur, but it is not expected to have any major effects on the vegetation of the Mountain. While habitat destruction, species elimination, and invasion of weedy species can result from over-use of trails and off-trail excursions, these effects are not expected to occur as a result of the increased use of the existing trails under this alternative.

Under Alternative B, because visitation to the Mountain is likely to increase (see Section 4.3.8), the potential for fire in high risk areas and effects on plant communities are likely to increase. Unlike the No Action, No Change Alternative, however, this alternative provides a mechanism for fire prevention through signing and fuel removal, and for fire control through an available source of water and rapid response of on-site staff.

4.3.3 Wetlands

With the exception of the water line corridor, no wetlands are located in the proposed development areas. Nevertheless, wetlands will be avoided in site selection of proposed development and in construction on the mountaintop under all alternatives. The total wetland acreage known on the mountaintop is less than one acre and is distributed among several very small parcels, and avoidance will be easy to accomplish. No effects on wetlands beyond that described in Alternative A will occur under Alternative B on the mountaintop. Less than one acre of potential jurisdictional wetland subject to regulation by the U.S. Army Corps of Engineers will be affected for the construction of the water line. These construction activities are authorized under the Corps of Engineers Section 404 Nationwide Permits and notification of construction activities to the Corps of Engineers will be required. Indirect effects from

increased volume of surface runoff into this already moist community most likely will be negligible. Increased sedimentation of this community will be unavoidable and may alter species composition. However, sedimentation can be minimized per the mitigation measures described in Section 4.3.1.1.

4.3.4 Wildlife (Vertebrates)

4.3.4.1 Construction Effects

Visitor Information Center

Under Alternative B, vertebrate habitat will be cleared for the construction of the visitor information center and associated structures. A review of both reported vertebrate populations for this area and the 1991 field survey failed to disclose unique features that would indicate this area is special habitat for the vertebrate community as a whole or any specific species. Indirect effects on the vertebrate community from modification of drainage pattern during construction will be short-term and are not expected to have any detrimental effects on the vertebrate community in the area.

Lodge and Cabins

Construction of a lodge, cabins and associated structures on the Mountain under Alternative B has the potential to affect a single PETS vertebrate species, the rufous-crowned sparrow. Effects on this species are discussed in Section 4.3.6.2. Field surveys during 1991 did not locate vertebrates unique to the proposed lodge and cabin areas, nor did they indicate the habitat included unique assemblages critical for the existence of the vertebrate community.

While the majority of the construction activity at the old lodge site would occur in previously disturbed areas, some new areas will ultimately be used to provide the modern facilities required for the operation and maintenance of a state park. A portion of the vertebrate habitat will be irretrievably lost with the construction of the lodge, cabins, and other structures; however, the overall amount is small. Direct impacts on the resident vertebrate community will be unavoidable. However, the ability of vertebrate species to invade and temporally relocate to adjacent habitat limits the effects on the vertebrate community.

Water Line, Access Roads, and Water Storage Tower

The proposed construction of the water line, water tower, and water line access roads will cause temporary displacement of segments of the vertebrate community. During the 1991 field survey, there was no indication that unique habitat needed for the continuance of individual species was present in these areas. The direct and indirect effects on the vertebrate community from construction of these structures and roads will be unavoidable, but short-term and of minor consequence.

4.3.4.2 Effects of Operation and Maintenance

No additional effects are expected as result of Alternative B activities. No effects from recreational activities are expected to occur. Several activities which will occur under Alternative B will have beneficial effects on the long-term and continued existence of the Mt. Magazine fauna. These include: elimination of hunting on the plateau (providing a refuge for game species), restriction of motorized vehicles to the paved areas of the plateau, resident

enforcement staff, restriction of access to areas of important habitat, educational and interpretive programs, and active monitoring and habitat enhancement programs.

4.3.5 Wildlife (Invertebrates)

Activities such as clearing and grading will remove invertebrate habitat but this should be of little consequence to invertebrates on the Mountain. As landscaping of these areas takes place, the reinvasion of these areas by different invertebrate species will take place. A positive benefit to all invertebrate species on the Mountain will be the increased environmental monitoring of species by multiple agencies.

4.3.6 Proposed, Endangered, Threatened, and Sensitive (PETS) Species

4.3.6.1 Plants

No PETS plant species, with the exception of a few individuals of prickly gooseberry (*Ribes cynosbati*), have been recorded in the area of the proposed visitor information center (Tucker 1980, 1990a), and none were seen during the 1991 field surveys. The direct effects of construction of the visitor information center and associated facilities include the clearing of a few plants of prickly gooseberry. There are large numbers of this species elsewhere on the Mountain outside the proposed development areas, and the removal of a few plants will not affect the continued existence of this species on the Mountain. Other effects on prickly gooseberry following completion of construction in this location can be minimized by control of visitor access through signs and designated trails around the visitor information area.

The potential for some adverse effects to PETS plant species exists at the old lodge site relative to construction of the lodge and cabins. The list of species which could be adversely affected includes Ouachita leadplant (*Amorpha ouachitensis*), Bush's poppy mallow (*Callirhoe papaver* var. *Bushii*) (if not already extirpated), small-headed pipewort (*Eriocaulon kornickianum*) (if not already extirpated), and broom nailwort (*Paronychia virginica* var. *scoparia*). Of these species, however, only the first and last would almost certainly be affected. The Ouachita leadplant occurs in the vicinity of the old lodge site as widely scattered shrubs, a few of which would probably be removed in construction-clearing activities. Loss of additional plants could occur as a result of construction-related activities (e.g., construction staging activities, inadvertent trampling). Flagging of individual plants prior to construction activities could reduce the loss of individual plants not directly in the way of construction of structures. Loss of a few plants, however, should not affect the continued survival of this species on the Mountain due to the presence of numerous plants elsewhere on the Mountain.

The broom nailwort occupies ledges and pavement outcrops at scattered locations all along the south bluffline. Because of its association with bedrock it probably has a higher potential for damage from indirect impacts (e.g., trampling) than from direct impacts from vegetation clearing activities. Use of flagging and establishment of buffer zones around populations prior to construction could help to reduce the loss of this species and the reduction of the population size. Control of visitor access will be necessary after construction to prevent trampling of the rock outcrop communities and their unique species.

With the exception of the broom nailwort, no PETS species were identified during the 1991 survey of the proposed water line corridor, access roads, and water tower. A few scattered clumps of this species were observed along the first bluffline (approximately 2,500 ft

elevation) from the top. These plants, however, were elongated and pale green as a result of too much shade, and better examples of this species are found on the Mountain. The clearing of the vegetation within the power line corridor for the water line will most likely be beneficial to these scattered clumps by providing a well-lighted habitat.

The inclusion of restricted use areas as an integral part of the operations and maintenance program for this alternative, and for Alternatives C, D and E, should be beneficial to all PETS species. Other positive benefits from environmental education/interpretive programs and environmental monitoring by multiple agencies will occur under this alternative that are not available under the No Action, No Change Alternative. Environmental programs should heighten awareness of the public concerning PETS species. In addition, the multiple agency monitoring could have immediate benefits to ensure the existence of PETS species and to formulate management guidelines to ensure their viability. Reduction of hunter access from four to two access points should reduce the potential for man-made fires that could destroy habitat of some PETS species. Permitted access for scientific study should play a major role in protecting unique habitat and in reducing duplicative collection of scientific voucher specimens for species which have already been documented numerous times.

4.3.6.2 Wildlife (Vertebrates)

Direct effects on the PETS vertebrate species of Mt. Magazine have been based on the likelihood of adverse (mortality) or beneficial effects on those species. Indirect effects on PETS species are based on secondary or indirect changes to habitat that alter community and species composition.

No PETS species, with the exception of the rufous-crowned sparrow (*Aimophila ruficeps*), have been recorded from any of the areas or were seen during the 1991 field surveys except at the old lodge site. The potential for negative effects on the rufous-crowned sparrow would increase under this alternative with construction of the lodge and cabins. As discussed in detail in Chapter 3.0, the rufous-crowned sparrow is known to inhabit the plant communities of the south bluffline. Construction activities, especially in the old cabin sites to the west of the old lodge site, may eliminate or modify a portion of the limited habitat of this species.

The rufous-crowned sparrow has been described as primarily a ground nester. Construction activities could expose the nest, eggs, and chicks to predation by other vertebrates, cause the loss of nest sites, and/or cause the abandonment of nest sites. Wherever possible, avoidance of rufous-crowned sparrow habitat or minimization of construction in its habitat will be practiced. Habitat evaluation and monitoring will be implemented prior to construction activities to identify specific habitat requirements (e.g., territory) and to recommend the amount of habitat to protect during construction and park operation.

Since the nesting/fledgling season would correspond with the peak visitor season, rufous-crowned sparrow nests may be subject to trampling and destruction by foot traffic. According to studies (Carlson, personal communication 1992), the rufous-crowned sparrow will abandon its nest if subjected to heavy foot traffic. Since little is currently known about the population size and dynamics of the Mt. Magazine population, loss of nests, eggs, or chicks would only serve to reduce the population size on the Mountain. Identification of nest sites and/or approximate locations and visitor control during the nesting and fledgling season will reduce effects on this species.

Outside the nesting season, this species will tolerate increased human activity; however, little is known of how this species will tolerate increased competition from other bird species as a result of increased human activities. The cumulative effects of both the direct effects described above and the indirect effects of competition and displacement by species known to be tolerant of human activities could affect the continued existence of the rufous-crowned sparrow population on Mt. Magazine.

4.3.6.3 Wildlife (Invertebrates)

No construction is planned in known habitats of invertebrate PETS; therefore, no effects on invertebrate PETS species are expected to occur under this alternative by construction. Routine operation and maintenance of the roadsides, specifically mowing or other means of vegetation and weed control, has the potential to eliminate the host plant species of the Diana fritillary during the time of its use by this species. This effect can be avoided by changing the mowing schedule and weed control practices. Alternative B will provide for better regulation of collection of this butterfly; environmental education to increase public awareness of its status and needs for continued survival on the Mountain; and the multiagency monitoring program can better identify its status on the Mountain and develop appropriate protection plans. Thus, Alternative B should be beneficial to the continued existence of this species on the Mountain.

4.3.7 Cultural Resources

The direct effect of the proposed development under this alternative would involve destruction of cultural resources through land clearing and construction activities. To date, 12 sites were found in the flagged survey area, and of these, 11 contain characteristics rendering them potentially eligible for nomination to the National Register. Significance testing and/or mitigation measures are recommended at these locations.

The effects of operation of the proposed park on significant cultural resources which are avoided by construction will be indirect and will be due to an increase in accessibility to the archeological sites and by the increased number of visitors expected under this alternative. As accessibility is increased by roads, trails, and development near cultural sites, the sites become vulnerable to nonscientific collecting and vandalism. These indirect effects will be fewer under this alternative than those under Alternative A because of the full-time presence of park personnel on the mountaintop and site monitoring provided for under Alternative B.

The specific effects and recommendations for the areas intensively surveyed as part of this study under Alternative B are as follows:

Visitor Information Center

Shovel tests on transects laid in the proposed 10 acre area surveyed for the visitor information center were negative. Thus, no effects on cultural resources in this 10 acre area are expected.

Lodge, Cabins, and Associated Structures

The old lodge and cabin sites on the south side of the Mountain were surveyed from the south side of the road to the bluff edge. To avoid dividing the previously recorded archeological site (3LO80), the existing Dormitory structure which remains on the north side of the road was

also examined. The entire site may be eligible for nomination to the National Register due to its relationship to the CCC/WPA era and its significance in American history and architecture. The proposed lodge and cabins on the south side could be built on the old CCC/WPA lodge and cabin sites as long as the effects are mitigated. Mitigation measures might include site documentation (photographs, architectural or engineering drawings), preservation, interpretation, or incorporation of remaining elements into the proposed facility design. These measures will be developed through consultation with the U.S. Forest Service, Arkansas Department of Parks and Tourism, the State Historic Preservation Officer, the Arkansas Historic Preservation Program, and the Keeper of the Register. Construction will be performed in accordance with U.S. Forest Service standards, which were adopted from National Park Service policies, for managing historic sites (National Park Service Management Policies, V:15). Relative to these policies, the buildings should not be reconstructed to the exact blueprint. The one remaining structure, the Dormitory structure, should be preserved and used (adaptive reuse). This recommendation would be in keeping with preservation goals and priorities of the State because it provides for active protection of significant components and standing structures. Burgraff and Rollett (1989) provide examples and guidelines for building structures which have similar CCC/WPA design elements.

The archeological survey of areas between the 18 CCC/WPA cabin sites and access roads resulted in the discovery of the Sion House Farmstead (3LO431). This site dates to the late 1800s and has been bisected by the small road leading to two of the cabins. Subsurface tests revealed the location of the house and one outbuilding. The stone-lined well and vegetation (flowers and large trees) remain at the site. Due to the presence of intact features and deposits, 3LO431 may be potentially eligible for nomination to the National Register. Any ground disturbing activities in this vicinity must be mitigated through a comprehensive program of data recovery or excavation, and archival research. Mapping of the site boundaries, features, and documentation of the three children's graves, one of which is precariously near the embankment of the main loop road to the lodge site, will be necessary if this site cannot be avoided.

Cameron Bluff Campground

A portion of the Cameron Bluff Campground which was limited to the area between the small loop roads (less than 20 acres) was surveyed. No new cultural resources were found except for a water well pad which may have been constructed during the CCC/WPA period. As long as the well is preserved, there should not be any effects on the cultural resources at this location.

Brown Springs Picnic Area

A small area (less than 5 acres) was surveyed at Brown Springs Picnic Area. One multicomponent archeological site was found (3LO429). The prehistoric component, which consists of an isolated projectile point fragment dating to the Archaic, is not considered significant. However, the historic Brown Farm complex and the CCC/WPA picnic ground are potentially eligible for the National Register. Evidence of the historic use consists of the large oak trees, the spring, the rock work, and surface artifacts. Subsurface excavations resulted in locating the position of the farmhouse and a mule shed. In addition to farming, the Brown family ran pack jennies for tourists on the Mountain. These archeological features have not been

significantly disturbed by CCC/WPA picnic area development. Due to the presence of intact deposits and features, and combined with the associated history and folklore of the Brown family, one of the first settlers on the Mountain, 3LO429 is potentially eligible for nomination to the National Register. While no development is proposed in this and the other alternatives, the site is recommended for preservation under all alternatives.

Water Line, Associated Roads, and Water Storage Tower

The proposed water line corridor on the south side of the Mountain, from the old lodge and cabin site (3LO80) south to Highway 10 (2.25 miles), and the proposed new access roads, were surveyed. Except for the precautions which must be taken relative to Site 3LO80, construction and maintenance of the remainder of the water line route or the access roads should not affect cultural resources.

The one-fourth mile road to the proposed water tower on Signal Hill (3LO430) was surveyed. No cultural resources were found in the actual road beds; therefore, no cultural resources should be effected by the restoration and maintenance of this road.

The proposed water tower location surveyed on Signal Hill consisted of a 2-3 acre area. This is the location of a well house and a concrete water storage tank (Site 49-47). The age of neither the well house structure nor the concrete tank have been verified; however, a drilled well is shown on the 1938 Mt. Magazine Development maps. If this structure dates to the CCC/WPA period, it may be potentially eligible and worthy of stabilization and preservation. Additional research and evaluation by an architectural historian is necessary to determine site significance and to make recommendations relative to the proposed plans at this location.

Greenfield Picnic Area

Approximately 5 acres were surveyed for cultural resources at the Greenfield Picnic Area. The area surveyed for cultural resources included the mowed clearing and a parcel in the woods on the southeastern side. This entire area was part of the Greenfield Farm (3LO92). Shovel tests in the proposed project area did not result in the location of intact subsurface features or building locations related to this site. One above-ground feature, a well/cistern, lies in the clearing. The main portion of the archeological site is located to the east, outside of the mowed area where vegetative evidence (numerous flowers and large trees), an older well/cistern, and surface artifacts are evident. The refuse dump for the site was also found. No activities, however, are proposed in the main portion of the site. Due to the absence of cultural features in the cleared area, except for the cistern, no significant effects on cultural resources should occur. Site 3LO92 is potentially eligible for nomination to the National Register; therefore, additional archeological investigations are recommended at this significant site.

East End Picnic Area

The East End Picnic Area was defined as the clearing and a small wooded area north and east of the clearing, that cover about 5 acres. Two historic components at this site, the Benefield Farm (Site 3LO94) and the CCC/WPA Recreation Area (Site 49-60), are potentially eligible for nomination to the National Register. Subsurface tests indicate the remains of at least one outbuilding in the cleared area and one in the woods. The features composing the CCC/WPA campground (existing picnic area) and the picnic loop (abandoned in the woods and

outside of proposed development areas) are worthy of protection. Subsurface disturbances should not occur in these areas until these sites have been tested and the effects are mitigated through a scientific data recovery plan.

4.3.8 Socioeconomics

Table 4.1 presents the estimated change in economic variables for Alternative B. The economic variables are gross sales, employment, and wages and salaries. A discussion of the economic model used to compute changes in these variables is provided in Appendix E, Part II. Effects are divided into direct effects, which are associated with the initial expenditures, and indirect effects, which are associated with a continuing stream of expenditures. The total effect is the sum of the direct and indirect effects which only pertain to the changes in gross sales. The impacts are further divided into short-term and long-term effects. Short-term effects are associated with the construction phase of the project and last only during the construction phase. Long-term effects are associated with tourist-related expenditures, are on-going, and are estimated on a yearly basis.

Under Alternative B, the expenditure of \$8 million for construction is expected to generate an additional 82 jobs as well as an additional \$10.4 million in gross sales and \$2.3 million in additional wages and salaries (Table 4.1). These jobs, sales, and wages and salaries cease upon completion of the construction phase. Once tourism and tourist expenditures begin, 78 new jobs should be created. As tourism continues, these 78 jobs would continue into the future as would the estimated \$6.5 million increase in gross sales and the \$1.2 million increase in wages and salaries associated with Alternative B.

Human and material resources, as well as power and energy, are required to design, construct, operate, and maintain all of the improvements for this alternative. Cost estimating methodologies and detailed lists of estimated first costs and annual costs for each of the alternatives are included in Appendix F. Under Alternative B, first costs are estimated to be \$8,138,400, and annual operation and maintenance costs are estimated to be \$858,090. First cost commitments for this alternative include construction, architectural, engineering, and planning costs. Annual costs commitments for this alternative include personnel, water, electric energy, chemicals, vehicle use (including the consumption of oil and gasoline), telephone service, insurance, solid waste disposal service, water, and other miscellaneous expenses.

As with other State construction projects, first costs required by Alternative B will be provided by the State of Arkansas. A portion of the annual costs are expected to be recovered through park revenues.

The method used to estimate revenues and profits for the various levels of development is described in Appendix E, Part III. The total estimated yearly revenue under Alternative B is \$898,000 and the estimated yearly net accounting profit is \$314,000. The average estimated range of visitation to Mt. Magazine under this alternative is 130,000 to 152,000 annually.

4.3.9 Opportunities for Public Use

Recreational opportunities would improve under this alternative. The overnight capacity of the mountaintop and its attractiveness to a more diversified population would be augmented by the addition of more camp sites, a lodge, cabins, a restaurant, and a visitor information

Table 4.1. Estimated economic effects to the primary impact area of Mt. Magazine for Alternative B¹.

	Change in Gross Sales ²	Change in Employment ³	Change in Total Wages and Salaries
Short-Term ⁴ Direct Effect	\$8.0 mil	n/a	n/a
Short-Term Indirect Effect	\$2.4 mil	n/a	n/a
Short-Term Total Effect	\$10.4 mil	82	\$2.3 mil
Long-Term ⁵ Direct Effect	\$4.2 mil	n/a	n/a
Long-Term Indirect Effect	\$2.3 mil	n/a	n/a
Long-Term Total Effect	\$6.5 mil	78	\$1.2 mil

¹ Estimated construction cost is \$8 million and the estimated total annual expenditure for this alternative is \$4.2 million.

² Computed from the gross sales multiplier.

³ Estimated additions to the total number of jobs in the primary impact area (Logan and Yell Counties).

⁴ Short-Term effects are associated with the construction phase of the project.

⁵ Long-Term effects are associated with tourist-related expenditures and are estimated on a yearly basis.

n/a Not applicable. The estimated economic effects are isolated into direct and indirect effects only for changes in gross sales.

Note: Refer to Appendix E, Part II for economic model used to compute changes in gross sales, employment, and wages and salaries.

d:\3018-820\eis\t-4-1.wp

center. The presence of the lodge and cabins on Mt. Magazine is expected to increase visitation and recreational use of the Mountain over Alternative A.

This alternative also provides for the development of educational opportunities, which includes interpretive programs and displays in the visitor information center. Educational opportunities and interpretive programs should also increase opportunities for public use over the No Action/No Change Alternative.

Areas of restricted use will be established to preserve elements of the Mountain's ecosystem. Restricted use areas should not affect opportunities for public use and will help achieve a balance between long-term use and protection of the Mountain's resources. While restricted use areas are provided under this alternative, research both in and outside of restricted areas will be allowed through a permit system. This permit system will eliminate duplicate collection of specimens; allow for the study of healthy, undisturbed communities and components; ensure compatibility of monitoring efforts and data collected; and increase the long-term protection of the Mountain's resources.

The designation of restricted use areas on the Mountain and the reduction of hunter access areas by one-half may inconvenience hunters but should not adversely affect use of the slopes by hunters. Other access points to the slopes are available from the base of the Mountain.

Short-term effects on recreational activities are likely during construction. Recreation is likely to be disrupted by noise, movement of heavy equipment, extra traffic, and temporary obstructions. Visitation by curious citizens may also temporarily increase during construction.

Construction of facilities at the old lodge site may temporarily affect the rock climbing and hang gliding activities currently taking place along the south face of the Mountain. Rock climbing activities may be affected by operation and use of the facilities on the south side of the Mountain. Objects thrown over the bluffs by visitors to the Mountain can increase the hazards for rock climbers and decrease their safety. Hazards to rock climbers can be minimized and avoided through several options, including implementation of construction good-housekeeping practices, restriction of climbing activities during construction, signing near the bluffs to protect climber safety below, and establishment of a buffer zone along the bluffline in which construction workers and visitors are prohibited. Temporary loss of access to the hang gliding area during construction will be short-term and should affect neither the continued use of this site nor the safety of the hang gliders.

It is likely that increased use resulting from the establishment of a state park on the plateau will eventually result in increased bear and human confrontations (Dr. Clark, personal communication 1991). The majority of these encounters will involve the bears' search for food. Proper waste control measures (i.e., bear-proof garbage cans and control of solid waste) will minimize potential confrontations.

4.3.10 Aesthetics

The development proposed under this alternative will change how the recreation areas look and therefore will affect the aesthetics of the area. Approximately 59 acres of land will be affected by a change in use under Alternative B. Whether these effects are considered to be positive or negative will mostly depend on the observer. Other possible effects on the Mountain's aesthetics include:

- The clearing, materials storage areas, and heavy machinery that will be present during construction will decrease the aesthetic value of the mountaintop; however, these activities are relatively short-term and the effect on aesthetics during the construction phase is not a major concern.
- There will be a reduction in vandalism and improper refuse disposal with the presence of full-time personnel on the Mountain, thereby increasing the aesthetic value of the Mountain.
- The location of the lodge at the old site on the south rim would be considered aesthetically pleasing to some visitors; others may feel that it interferes with the grand view from the south rim.
- The construction of the water line and new access roads on the south side of the Mountain will increase the existing visual intrusion on the view from certain locations on the south side of the mountaintop. This visual intrusion should lessen with time.

4.4 Alternative C

This alternative provides for a level of development similar to Alternative B; it also provides a number of unique facilities and features which provide and promote education and research opportunities and uses of the Mountain.

In addition to the existing facilities, Alternative C includes construction and operation of three additional toilets, a conference center with an 18-20 room lodge, 10-18 cabins, a group bunk facility, a restaurant, a visitor information center with a multi-purpose research/teaching facility and amphitheaters and/or pavilions, 6 employee residences, a maintenance building, 20 camp units without water at the quarry camp area, and a gate house at the park entrance on Forest Development Road 1606. Approximately 21 full-time employees and 7 state-owned vehicles are needed to manage, operate, and maintain the state park under this alternative.

4.4.1 Soil, Water, and Air

Fourteen acres of land would be cleared, graded, and subjected to heavy equipment traffic during construction (0.4 acres more than under Alternative B). Approximately 8,600 gallons per day of wastewater (an increase in 800 gallons per day over Alternative B) would be treated and discharged to either Big Shoal Creek (proposed lodge site overlooking Bear Hollow) or West Bass Creek (old lodge site), depending on the location of the lodge. Total soil loss after the development of this alternative is completed is estimated to be 294.6 tons per year, an increase of 0.4 tons per year over Alternative B. Average soil loss after development is completed is estimated to be 4.9 tons per acre per year, a decrease of 0.1 tons per acre per year from Alternative B. No additional effects on soil, water, and air beyond those described under Alternative B are expected to occur under this alternative.

4.4.2 Vegetation

4.4.2.1 Construction Effects

No additional effects on plant communities beyond those described under Alternative B are expected to occur under this alternative, because the amount of vegetation that will be removed for construction and irretrievably lost from the Mountain increases by only 0.4 acres over Alternative B.

Conference Center/Lodge Complex

For the construction of the alternate conference center/lodge complex at the location overlooking Bear Hollow, portions of a 49-year old pine community and mesic oak-hickory forest (with some xeric components) will be irretrievably lost. Construction of the conference center/lodge complex should not affect the continued existence of either of these plant communities on the Mountain, because the amount of these communities lost under this alternative is small with respect to the total acreage of these plant community types on the Mountain.

Quarry Camp Area

The construction of camp units at the proposed quarry camp area on the northeast edge of the mountaintop under this alternative should not have adverse effects on the plant communities of this area. The area at the quarry site has already been cleared and contains a disturbed, weedy, herbaceous community surrounded by a shortleaf pine community.

4.4.2.2 Effects of Operation and Maintenance

Under Alternative C, no additional recreational opportunities beyond existing opportunities will be available to visitors. Increased use of the trails for educational and research opportunities, however, will most likely occur. While a change in vegetation in areas adjacent to trails can result from over-use of trails and off-trail excursions, no adverse effects are expected to occur as a result of the increased use of the existing trails. Most of the use under this alternative is expected to be by research, teaching, conservation and educational groups that will be apprised by the state park staff of the effects associated with incorrect trails and facility use.

4.4.3 Wetlands

As discussed in Section 4.3.3, no effects beyond those discussed under Alternative B are expected.

4.4.4 Wildlife (Vertebrates)

No additional effects on the native vertebrate communities beyond those discussed under Alternative B are expected to occur under this alternative. The emphasis on research and scientific study should provide an added benefit not associated with the other alternatives. These benefits include a more complete inventory of the Mountain's vertebrates, and a better understanding of their ecology.

4.4.5 Wildlife (Invertebrates)

No additional effects on invertebrate species beyond those discussed under Alternative B are expected to occur under this alternative. The increased emphasis upon usage by scientific research, educational, and conservation organizations could be a positive benefit for all invertebrate species on Mt. Magazine. Such activities should encourage continued education and research during the operation of the proposed state park and should have long-term benefits to the protection and maintenance of the invertebrate species and populations on the Mountain.

4.4.6 Proposed, Endangered, Threatened, and Sensitive (PETS) Species

4.4.6.1 Plants

No additional effects on plant PETS species beyond those described under Alternative B are expected to occur under Alternative C.

4.4.6.2 Wildlife (Vertebrates)

No additional effects on vertebrate PETS species beyond those described under Alternative B are expected to occur under Alternative C.

4.4.6.3 Wildlife (Invertebrates)

No additional effects on invertebrate PETS species beyond those described under Alternative B are expected to occur under Alternative C.

4.4.7 Cultural Resources

No additional effects on cultural resources for those sites and areas described under Alternative B are expected to occur under this alternative. New areas surveyed under this alternative include the proposed conference center/lodge complex overlooking Bear Hollow and the proposed quarry camp area on the northeast boundary of the affected environment.

Conference Center/Lodge Complex Above Bear Hollow

The proposed conference center/lodge complex overlooking Bear Hollow east of the Greenfield Picnic Area was surveyed. No significant cultural resources were found in the approximately 30 acres surveyed at this location. (Note: This 30 acres also included the area proposed for the development of a 19th century homestead under Alternatives D and E). Thus, no effects on cultural resources should occur at this location.

Quarry Camp Area

With the proposed additions of a quarry camp area, additional effects on cultural resources are anticipated. Approximately 10 acres defined by the clearing west of the quarry was surveyed at this location. No intact cultural resources were found in this field. Outside of this clearing, a specific survey to locate the Lozier Farm was completed. The remains of the Lozier Farm (3LO432), including a stone-lined well, was discovered east in the woods outside of this 10-acre clearing. No effects on cultural resources in the area as surveyed are expected and no development is planned in the vicinity of the Lozier Farm (3LO432).

4.4.8 Socioeconomics

Table 4.2 presents the estimated change in economic variables for Alternative C. These economic changes were completed exactly as for Alternative B.

Under Alternative C the estimated impact on long-term total gross sales, when compared to Alternative B, increases by \$1 million as a result of the additional \$400,000 spent on initial construction costs, as well as the increased tourism expenditures expected to occur with a higher level of development. Similar increases are projected for both employment and total wages and salaries.

Human and material resources, as well as power and energy, are required to design, construct, operate, and maintain all of the improvements for this alternative. Under Alternative C, first costs are estimated to be either \$8,440,420 (lodge overlooking Bear Hollow) or \$8,138,440 (old lodge site), depending on the selected location of the lodge. Annual costs are estimated to be \$858,090. Cost estimating methodologies and detailed lists of estimated first costs and annual costs for each of the alternatives are included in Appendix F.

Similar to other State projects, first costs required by Alternatives C will be provided by the State of Arkansas. A portion of the annual costs are expected to be recovered through park revenues.

From an engineering perspective, there is no discernible difference in the effects resulting from locating the lodge, cabins, and related facilities either at the original lodge location or at the lodge location overlooking Bear Hollow. The human, economic, and material resources required to develop either site are essentially the same as shown in the cost estimates in Appendix F.

The method used to estimate revenues and profits for the various levels of development is described in Appendix E. The total estimated yearly revenue under Alternative C is \$846,000 and the estimated yearly net accounting profit is \$296,000.

The average estimated range of visitation under this alternative is 201,000 to 235,000 annually.

4.4.9 Opportunities for Public Use

Additional opportunities for public use beyond those described under Alternative B are provided for under Alternative C. These additional use opportunities include an increase in education and scientific research opportunities with the addition of a library, teaching and research laboratory, and large group facilities, and an increase in overnight camping opportunities for horse riding groups and recreational vehicles (RVs) at the quarry camp area.

4.4.10 Aesthetics

The development proposed under this alternative will change how the recreation areas look, and therefore will affect the aesthetics of the area. Approximately 60-61 acres of land would be affected by a change in use. Whether these effects are considered to be positive or negative will mostly depend on the observer. The location of the lodge under this alternative does affect scenery as viewed from the two alternative lodge sites. The old lodge site on the south rim offers a panoramic view of the valley and Blue Mountain Lake below. The Bear

Table 4.2. Estimated economic effects to the primary impact area of Mt. Magazine for Alternative C¹.

	Change in Gross Sales ²	Change in Employment ³	Change in Total Wages and Salaries
Short-Term ⁴ Direct Effect	\$8.4 mil	n/a	n/a
Short-Term Indirect Effect	\$2.5 mil	n/a	n/a
Short-Term Total Effect	\$10.9 mil	87	\$2.4 mil
Long-Term ⁵ Direct Effect	\$4.8 mil	n/a	n/a
Long-Term Indirect Effect	\$2.7 mil	n/a	n/a
Long-Term Total Effect	\$7.5 mil	89	\$1.4 mil

¹ Estimated construction cost is \$8.4 million and the estimated total annual expenditure for this alternative is \$4.8 million.

² Computed from the gross sales multiplier.

³ Estimated additions to the total number of jobs in the primary impact area (Logan and Yell Counties).

⁴ Short-Term effects are associated with the construction phase of the project.

⁵ Long-Term effects are associated with tourist-related expenditures and are estimated on a yearly basis.

n/a Not applicable. The estimated economic effects are isolated into direct and indirect effects only for changes in gross sales.

Note: Refer to Appendix E, Part II for economic model used to compute changes in gross sales, employment, and wages and salaries.

d:\3018-820\eis\t-4-2.wp

Hollow site offers a limited view, but may appeal to the visitor who likes a more rustic setting. No additional effects on the Mountain's aesthetics beyond those described under Alternative B are expected to occur under this alternative.

4.5 Alternative D (Preferred Alternative)

This alternative provides the facilities and operations required for economical, year-round operation and maintenance of a state park. In addition to the existing facilities, Alternative D includes the construction and operation of three toilets, a 40-60 room lodge with pool, 5-15 cabins, a restaurant, an amphitheater, a visitor information center, a 19th century homestead, 5.8 miles of hiking trail around the bluffline, 6 employee residences, a maintenance building, 20 camp units at the proposed quarry camp area, and an increase in the number of picnic units over the No Action, No Change Alternative. With this alternative, approximately 26 full-time employees and 9 state-owned vehicles are needed to manage, operate, and maintain the proposed state park.

4.5.1 Soil, Water, and Air

4.5.1.1 Soil

Construction of recreation facilities and utility lines under Alternative D would eliminate existing ground cover and result in either displacement or compaction of soils. The total acreage that will be cleared, graded, and subjected to heavy equipment traffic during construction and landscaped is estimated to be 18.5 acres. Possible indirect effects of construction activities are the changes in drainage patterns from grading, erosion, and sedimentation. The proposed locations for facilities, however, are fairly flat or gently sloped; therefore, these indirect effects are expected to be temporary, minimal, and of little or no consequence. The water line, booster stations, and associated access road will be constructed over rough, steep terrain. Erosion may be expected to occur during construction because of the steep slope. To minimize erosion, land disturbances would be kept to a minimum and restabilization scheduled as soon as practical. Soil Conservation Service standards and specifications for erosion and sediment control should be used for the design and construction of erosion and sediment control measures. Mitigation measures are discussed in greater detail in Section 4.7.

The Universal Soil Loss Equation (Corbitt 1990) was again used in the impact analysis to estimate the amount of soil loss as a result of development under this alternative. The total soil loss after development is completed is estimated to be 294.3 tons per year, an increase of 0.1 tons per year over the Alternative B and 0.5 tons per year less than Alternative C. The average soil loss was estimated to be 4.6 tons per acre per year, an increase of 4.2 tons per acre per year over the average soil loss before development. Most of the soil loss is attributable to the water line access road. This rate of sediment loss is not expected to have any long-term, cumulative downstream effects because the size of the affected area is relatively small compared to the size of the watersheds of receiving streams. Additionally, intervening forested areas will buffer the streams from the long-range transport of sediment, and that sediment will be distributed among several discrete drainages. Effects can be further mitigated, for example, by grading and graveling access roads, and establishing grassed waterways and ditches along the access roads.

During operation and management of recreation facilities, the use of unpaved Forest Development Road 1606 on the west end of Mt. Magazine will be limited. By restricting the use of this road, erosion and sedimentation are minimized in this hydrologically sensitive area. In addition, restricted use of the area west of Brown Springs will minimize the number of people exploring the bluffs and traversing the low, creeping slopes above the rock faces; therefore, there will be no effect on the current rates of soil movement on these unstable slopes.

4.5.1.2 Water

The construction and on-going operation and maintenance of the proposed development under this alternative would result in increased stormwater runoff. Total increased storm flows were estimated to be approximately 19 cfs by applying the Rational Method and assuming a 3.5 inch per hour storm, which is the 100 yr. design storm. This total flow off the affected area would also be mixed with runoff from an even larger watershed area, and will be distributed among several discrete drainages; therefore, the actual runoff from the affected area would result in an insignificant increase in flow in each drainage, and no significant downstream cumulative effects. Stormwater flows generated from the site will be managed in accordance with all applicable regulations.

Hydrocarbons and other compounds could be present in runoff from paved areas with vehicle traffic. Following the identical rationale and approach to analyzing the effects of these compounds as under Alternative B, these compounds are not expected to cause any significant downstream cumulative effects.

The groundwater recharge area for known springs on the north side of the Mountain is located largely in the restricted area west of Brown Springs and will not be affected by development on Mt. Magazine. Reduction in recharge areas due to addition of impervious surface is less than 1 percent of the total available recharge area; therefore, reduction in recharge is expected to be minimal and of little or no consequence.

Construction of the water line and storage facilities will provide a year-round supply of water on the Mountain. It is anticipated the source of water will be the towns of Blue Mountain and Magazine. Officials from these towns have indicated there should be sufficient water supply to meet the needs of Mt. Magazine and their respective customers.

As described in Chapter 3.0, water resources, which sustain aquatic life and terrestrial animal species on the Mountain, are limited. Indirect effects from a few operation and management activities could potentially influence water available to the Mountain's fauna. For example, the water quality of some of the springs and the pond within the proposed quarry camp area may be affected by runoff from the proposed horse camp area and the "grey water" of RV camping units. However, proper disposal of the horse-generated waste, RV grey water and stormwater contaminated by these wastes can be managed to prevent its entry into surface and spring water. Appropriate management approaches include:

- providing a consumptive water source other than the quarry pond;
- not allowing direct access to the quarry pond by horses;

- development of corral areas for horses. These should be surfaced and curbed to allow control of washdown water and contaminated stormwater into a dedicated sanitary station containment tank which could be pumped as needed; and
- placing signs in the camp area regarding location of the RV sanitary station.

With these measures in place, water quality should not be adversely affected.

Mt. Magazine is subject to an increased number of ice storms during the winter months (see Chapter 3.0); therefore, during inclement weather, sand is used on roadways by the Arkansas Highway and Transportation Department. Effects on water quality are expected to be minimal and of little or no consequence.

The proposed toilets, which require no water or electric energy, would improve human waste disposal in recreation areas and provide for the protection of both human health and water quality.

Wastewater generated as a result of the proposed improvements will be treated and released off the Mountain. Approximately 16,700 gallons per day wastewater, an increase in 8,100 gallons per day over Alternative C, would be treated and discharged to either Big Shoal Creek (proposed lodge site overlooking Bear Hollow) or West Bass Creek (old lodge site), depending on the selected location of the lodge. In order to avoid discharging treated wastewater into the special interest area, effluent may be hard piped for discharge to the approximate 1,600 ft elevation. Although it is unclear whether this mitigation measure will be needed, particularly for the wastewater treatment facility that would discharge off the south side of the mountain into West Bass Creek, provisions for hard piping the effluent are included in the cost estimates (Appendix F: Part III). The Arkansas Department of Parks and Tourism will apply for an NPDES permit to operate a wastewater treatment plant. In addition, the treatment facility would be expected to produce effluent of a quality that will comply with the discharge permit conditions; however, effluent will be oxygen demanding and contain nutrients such as phosphorus and nitrogen. These nutrients will promote the growth of vegetation in proximity to the outfall of the discharge pipe. However, no significant cumulative downstream effects are anticipated.

4.5.1.3 Air

The proposed development would not degrade the ambient air quality, therefore, it will have no effect on human health, vegetation, wildlife, and the environment in general. Dust may be raised during construction but can be controlled by spraying water on the soil and excavated material to keep it on the ground, graveling access roads, and covering soil and debris piled in open trucks.

Potential odors may arise from the wastewater treatment plant proposed under this alternative even when operated properly. Mitigating measures that could be used to reduce odor drift include use of a vegetated buffer zone around the wastewater treatment plant and locating the wastewater treatment plant away from high use visitor areas.

4.5.2 Vegetation

4.5.2.1 Construction Effects

Visitor Information Center

Under Alternative D, a shortleaf pine community and mesic oak-hickory forest will be cleared for the construction of the visitor information center and associated structures. The amount of these communities cleared will increase under this alternative compared to previous alternatives. The mesic oak-hickory forest present in this area is in an earlier successional stage than those found at many other locations on the Mountain. At this location, neither the pine community nor the mesic oak-hickory forest exemplifies the original forest cover on Mt. Magazine; both types have low species diversity. Indirect effects on these plant communities and their component species from altered drainage patterns during construction will be short-term and are not expected to have an adverse effect on the plant communities or species in this area.

The mesic bluffline and scrub oak communities on the ledges and outcrops near the bluffline should not be affected by the construction of the visitor information center and associated facilities. No construction activities are designated in these communities. An approximate 1,000 ft wide vegetative buffer exists between these communities and the proposed area for construction of these facilities.

Lodge and Cabins

Construction of a lodge, cabins, and associated structures on the Mountain under Alternative D has the potential to affect several different plant communities, depending on the site chosen. Plant communities that will be affected by construction at the proposed lodge site overlooking Bear Hollow include 49-year old pine community on the northern half of the proposed lodge site and mesic oak-hickory forest (with some xeric components) on the southern half. While a portion of these communities will be irretrievably lost, the effects of construction on these communities should be inconsequential because both the pine community and the mesic oak-hickory forest in this location have low species diversity and have no unique elements. Additionally, the overall amount of construction area is small with respect to the total amount of acreage of these community types on the Mountain. Field surveys in 1991 noted that the dominant plant species within the mesic oak-hickory community were relatively small in diameter at breast height compared to other populations of these species on the Mountain. This feature probably indicates a fairly young successional stage of development of this forest community type following recovery from early land clearing for agricultural purposes.

Plant communities that will be affected by construction at the old lodge site include xeric oak-hickory forests, juniper-hardwood woodlands, xeric sandstone community, and a small number of glade areas and prairie openings in the juniper-hardwood woodlands. While much of the construction activity at this site is proposed in previously disturbed areas and in the locations of the old cabins and lodge, some new areas will be affected to construct up-to-date facilities for the operation and maintenance of a state park (e.g., wastewater treatment or package plant, larger parking areas, and access roads). Direct effects on portions of the juniper-hardwood woodlands and accompanying glade and prairie openings will be unavoidable under this alternative. Because of the limited distribution of this plant community, construction activities at this location may fragment and decrease the size of this already limited plant

community. The juniper-hardwood woodlands and their associated openings are considered to be a unique feature on the Mountain both floristically and because they provide habitat for the rufous-crowned sparrow, a sensitive vertebrate species. Construction activities in this and in the xeric sandstone plant communities, particularly in areas where the old cabin sites are close to the bluffline, may affect outcrop species such as knotweed (*Polygonum tenue*), fame flower (*Talinum* spp.), and broom nailwort (*Paronychia virginica* var. *scoparia*), and fragile soil lichen species. Both direct (i.e., heavy equipment impacts) effects, which are unavoidable, and indirect effects, such as soil erosion, sedimentation, and changes in drainage patterns, could decrease the population sizes of these species and reduce the size of these already limited communities.

Additional concerns exist over the establishment of weedy and invasive species as a result of construction, that may out compete native and existing plant species. Evidence of this phenomenon can be seen at the hang gliding site where much of the area has been cleared of vegetation for this recreational activity. Many colorful, yet weedy and invasive species, such as false garlic (*Nothoscordum bivalve*), Venus looking glass (*Triodanus perfoliata*), spring beauty (*Claytonia virginica*), and chickweed (*Stellaria* sp.), can be found at this site. This site differs markedly from the other old cabin sites that have not experienced recent clearing and which do not receive extensive use.

Whether effects of construction activities at the old lodge site will be detrimental to the continued maintenance of the juniper-hardwood woodland and bluffline communities on Mt. Magazine is unknown at this time. While irretrievable/irreversible loss of portions of these communities will occur as a result of construction, it is generally thought that the effects on the juniper-hardwood woodlands and the bluffline xeric sandstone community can be reduced by conducting construction activities in previously developed areas. However, some effects on undisturbed portions of these communities will be unavoidable.

Avoidance of areas containing special-status species and unique components of these plant communities should be exercised whenever possible, and construction moved up on the slopes to the more xeric oak-hickory community. Habitat and species monitoring and protection should be implemented during construction activities.

During construction at the old lodge site, some losses of the adjacent xeric oak-hickory community will also occur. Due to its widespread distribution on the Mountain, effects on this community as a whole should be negligible.

Water Line, Access Roads, and Water Storage Tower

Although the water line is proposed to be constructed in an existing power line corridor, removal of vegetation will be required along the entire route for the construction of the proposed water line and access roads. The amount of vegetation to be cleared, however, is negligible compared to the amount present on the top and slopes of the Mountain. Additionally, the vegetation present within the power line corridor has been disturbed previously by construction and maintenance activities for the previous utilities.

While the vegetation includes many species indicative of disturbed conditions, it retains elements of the adjacent plant communities found along the southern slopes and bluffs of the Mountain. At the higher elevations just above the bluffline, overstory tree species of the juniper-hardwood woodlands will be removed. On the steep upper slopes the overstory, shrub, and herbaceous elements of the xeric oak-hickory community will be removed during

construction; however, these individuals generally are small in stature compared to the adjacent undisturbed community. Elements of mixed pine-hardwood forest type will be removed in the transitional zone between 1,600-2,000 ft, with the majority of these species being hardwood species, unlike the mixed pine-hardwood community flanking the right of way. Below this elevation, shortleaf pine and associated herbaceous species will be removed. At the lower elevations below the pine community hydrophytic species (i.e., tolerant of wet or moist soil conditions), including sweet gum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*), will be removed. While numerous elements of several plant community types will be removed for the construction of the proposed water line and access roads, the impacts to the surrounding plant communities should be negligible because the width of the power line corridor should allow dispersal along the corridor. The construction of access roads in some of the adjacent plant communities, however, may result in the irreversible/irretrievable loss of large trees indicative of the original forests once present along the Mountain slopes and a small amount of juniper-hardwood woodland with prairie-like openings at approximately 2,100 ft. The overall direct effects of the construction of the new access roads, however, should be negligible.

Indirect effects on the adjacent plant communities and the communities at the lower elevations as a result of increased erosion, sedimentation, and changes in drainage patterns and volume of water should be small, with the potential exception of the wetland community at the lower elevations (see Section 4.5.3).

Effects of the construction of the water tower at the base of Signal Hill will be negligible since this construction will be completed in an area with existing structures (i.e., well house and concrete water storage tank) and which has been disturbed previously.

Quarry Camp Area

The construction of camp units at the proposed quarry camp area on the northeast edge of the mountaintop under this alternative should not have effects on the plant communities of this area. The area at the quarry site has already been cleared and contains a disturbed, weedy community surrounded by a shortleaf pine community.

Greenfield Picnic Area

Under Alternative D, additional picnic units and other facilities will be constructed at the Greenfield Picnic Area, but the construction of the new units and associated facilities will take place in open areas currently cleared of woody vegetation. No effects to the plant communities are expected to occur for the construction of additional picnic units, restroom facilities, and a pavilion.

Rim Trail

An additional 1.3-1.5 acres will be cleared for the construction of a proposed rim trail on the Mountain. This proposed rim trail traverses several plant community types on the Mountain, including scrub oak woodlands on the north bluffs, and mesic oak-hickory forest and mesic bluffline communities on the north side of the Mountain and on the rim above Bear Hollow. Construction of the trail should have negligible effects on these plant communities. Effects can be minimized through the use of low-impact trail construction methods that do not

utilize heavy equipment, but use manpower and human labor. A change in species composition, specifically the increase in weedy species, will occur directly adjacent to the trail as a result of trail clearing activities.

19th Century Homestead

Two sites were evaluated for the construction of a proposed 19th century homestead under Alternative D. Regardless of the site location, additional acres of vegetation will be removed for the construction of this facility. The proposed 19th century homestead site north of the proposed lodge site overlooking Bear Hollow will affect two types of plant communities at this location: an open, previously disturbed grassland, and a sphagnum seep community. Although the seep area of this site is currently not known for any species of special concern, it may provide adequate habitat for the re-introduction of the small-headed pipewort (*Eriocaulon kornickianum*) on the Mountain. While suitable pipewort habitat may be present at this site, the construction of the homestead at this site is not necessarily precluded. Several acres are available for the development of the 19th century homestead at this site in the open grassland community. Protection of this potential habitat for the reintroduction of the small-headed pipewort onto Mt. Magazine should occur under this alternative if this site is selected.

The proposed 19th century homestead site across from the old lodge and cabin sites will affect mesic oak-hickory forest. The plant community in this location contains several large white oak trees (*Quercus alba*). These plants are indicative of an older growth forest on the Mountain and may be similar to the original forest cover on the Mountain. Actual species diversity of this area has not been quantified, so direct comparisons cannot be made with the diversity of the mesic oak-hickory forest on the north slopes of Mossback Ridge, known to be a highly diverse community (Tucker 1990a). No species of concern have been recorded to date from this area and none were observed during the 1991 field reconnaissance.

4.5.2.2 Effects of Operation and Maintenance

Facilities, Structures, and Grounds

No additional effects on the vegetation at the lodge, cabins, visitor information center, and other sites are expected as a result of structure, facility and landscape maintenance, and maintenance of utility right-of-way corridors. Vegetation management in these areas should conform to the Final EIS for Vegetation Management in the Ozark-Ouachita Mountains (U.S. Forest Service 1990c), which contains guidelines considered to be environmentally acceptable for U.S. Forest Service lands.

Park Use

No adverse effects on the vegetation are expected to occur from recreational activities under this alternative. Hang gliding on the Mountain will continue to occur at an old cabin site that has already been disturbed. Rock climbing will be restricted to the south bluffs. Rock climbing is not expected to increase; therefore, unique species that inhabit the crevices of rock outcrops and bluffs on the south side of the Mountain should not be affected by recreational use.

Under this Alternative, visitation to the proposed state park is expected to be greater than under Alternatives A, B, and C. During the operation of the proposed state park, however, the rate of use of the lodge, cabins, visitor information center and recreational sites will be variable

throughout the year. Visitor use of these facilities and sites is expected to be greatest during the spring and fall when the temperatures are more amenable to recreational use of the Mountain. As the number of visitors to the Mountain increases, direct and indirect effects on the plant communities are also expected to increase. Trampling of species in high use areas such as the visitor information center and the lodge site is expected to increase under this alternative over Alternatives A, B, and C. These effects can be minimized by visitor and pedestrian control via established trails and use areas, fencing, signing at the lodge, cabins, visitor information center, campgrounds and picnic areas, and by the establishment of buffer zones around these communities.

Under Alternative D, increased use of the trails is likely to occur, but it is not expected to be significant because it will be offset by the addition of approximately 5.8 miles of new trails. While direct effects on vegetation can result from over-use of trails and off-trail excursions, no adverse effects on the vegetation on Mt. Magazine are expected to occur as a result of the increased use of the existing trails. A change in species composition, specifically an increase in a number of non-native, weedy species, will occur directly adjacent to the trail.

Under Alternative D, no additional effects are expected to occur from use of the additional picnic units at Greenfield Picnic Area or at either proposed location for the 19th century homestead site.

Because visitation to the Mountain is likely to increase under Alternative D (see Section 4.5.7), the potential for fire in high risk areas and effects on plant communities is likely to increase. Unlike the No Action, No Change Alternative, however, this alternative provides a mechanism for fire prevention through signing and fuel removal, and for fire control through an available source of water and more rapid response of on-site staff compared to Alternative A.

Administrative Activities

Several administrative activities that will take place under Alternative D (but that are not provided under Alternative A) will have beneficial effects on the long-term and continued maintenance of the flora of Mt. Magazine. These activities include: (1) restriction of access to the mesic oak-hickory community along Mossback Ridge, and to the mesic bluffline and scrub oak woodland communities west of Brown Springs; (2) resident enforcement staff to enforce restricted access to these areas; (3) visitor educational and interpretive programs that will communicate the unique features of the Mountain and will educate visitors about the protection of plant communities and special status species; (4) a more active monitoring program to readily identify effects on plant communities and special status species; and (5) a permit distribution system for scientific study of elements on the Mountain. The restricted access will allow those most sensitive or important plant communities on the Mountain to remain in an undisturbed state. Because a permit system will be used to allow access into these areas on the top of the Mountain, sufficient undisturbed habitat should be available to maintain the diversity, richness, and health of the flora of the Mountain and of unique plant communities and their component species.

Similar to Alternative A, plant succession will continue to occur on the Mountain in specific communities (e.g., sphagnum seep community, prairie and glade openings in juniper-hardwood woodlands, and scrub-oak woodlands). Under Alternative D, however, multiagency

species and habitat monitoring and management (i.e., by the Arkansas Department of Parks and Tourism and other state and federal agencies) is likely to increase to prevent loss of these communities and their component species.

4.5.3 Wetlands

With the exception of the water line corridor, no wetlands are located in the proposed development areas. Nevertheless, practices will be implemented to avoid wetlands during the selection of the specific sites for development and construction on the mountaintop. Because the total wetland acreage known on the mountaintop is less than one acre and is distributed among several very small parcels, avoidance will be easy to accomplish. Therefore, no effects on wetlands on the mountaintop beyond that described in Alternative A will occur under this alternative.

Less than one acre of potential jurisdictional wetland subject to regulation by the U.S. Army Corps of Engineers will be affected for the construction of the water line. These construction activities are authorized under the Corps of Engineers Section 404 Nationwide Permits and notification of construction activities to the Corps of Engineers will be required. Indirect effects of increased surface runoff on this community will most likely be negligible. Increased sedimentation of this community may change species composition; however, sedimentation of this community can be minimized per the mitigation measure described in Section 4.5.1.1.

4.5.4 Wildlife (Vertebrates)

No additional effects on the resident and migrant vertebrate communities beyond those discussed previously for Alternatives B and C are likely under this alternative, despite increased acreage cleared and anticipated increases in visitation. Displacement of resident populations immediately adjacent to new facilities (i.e., lodge and cabins, 19th-century homestead) is likely. Based on the proposed locations for the construction of the 19th century homestead and the lodge site overlooking Bear Hollow, this displacement should not affect the continued existence of the vertebrate populations on the Mountain. Displacement of resident vertebrate species at the old lodge site is likely to occur because of the high concentration of visitors expected at this site.

4.5.5 Wildlife (Invertebrates)

Activities such as clearing and grading will remove invertebrate habitat. Landscaping activities should allow the re-invasion of some invertebrate species. It is more likely that the original populations will be replaced by more common invertebrate species. A positive benefit to all invertebrate species would be the environmental education/interpretive programs and environmental monitoring by multiple agencies.

4.5.6 Proposed, Endangered, Threatened, and Sensitive (PETS) Species

4.5.6.1 Plants

No PETS plant species, with the exception of a few individuals of prickly gooseberry (*Ribes cynosbati*), have been recorded from the area of the proposed visitor information center (Tucker 1980, 1990a), or were seen during the 1991 field surveys. While an increase in acres cleared for the visitor information center increases the likelihood of the clearing of the few plants of prickly gooseberry at this location over Alternative C, there are large numbers of this species

elsewhere on the Mountain outside the areas proposed for construction. The removal of a few plants should not affect this PETS species. Trampling of prickly gooseberry plants following construction can be minimized by control of visitor access through signs and designated trails.

The list of species which could be affected by the construction and use of the lodge and cabins at the old lodge site includes: Ouachita leadplant (*Amorpha ouachitensis*), Bush's poppy mallow (*Callirhoe papaver* var. *Bushii*) (if not already extirpated), small-headed pipewort (*Eriocaulon kornickianum*) (if not already extirpated), and broom nailwort (*Paronychia virginica* var. *scoparia*). Of these species, however, only the first and last would almost certainly be subject to loss during construction and trampling during operation of these facilities. The Ouachita leadplant occurs in the vicinity of the old lodge site as widely scattered shrubs, a few of which would probably be removed in vegetation clearing activities. Loss of additional plants could occur as a result of construction-related activities (e.g., construction staging activities, inadvertent trampling). Flagging of individual plants prior to construction activities could minimize the unnecessary loss of individual plants. Loss of a few individuals, however, should not adversely affect this PETS species due to the presence of numerous plants elsewhere on the Mountain. The broom nailwort occupies ledges and pavement outcrops at scattered locations all along the south bluffline. Because of its association with bedrock it probably has a higher potential for damage from indirect effects (e.g., trampling) than from direct effects (e.g., vegetation clearing activities). Use of flagging and buffer zones around broom nailwort populations prior to construction should minimize effects on this plant species. More importantly, with control of visitor access to the outcrops through the establishment of buffer zones, designated pedestrian trails, fencing and/or signing, effects on this PETS species can be avoided and/or minimized during operation of the state park.

With the exception of the broom nailwort, no PETS species were identified during the 1991 survey of the proposed water line corridor, access roads, and water tower. A few scattered clumps of this species were observed along the first bluffline (approximately 2,500 ft elevation) from the top. These plants, however, were elongated and pale green as a result of the heavy shading from overstory and understory species; and better examples of this species are found elsewhere on the Mountain. The clearing of the vegetation within the power line corridor for the construction of the water line will most likely be beneficial to these scattered clumps by providing a well-lighted habitat.

Many PETS species, including Ozark chinquapin, Ouachita leadplant, broom nailwort, prickly gooseberry, Epling's wood-nettle (*Stachys eplingii*), Wood's false hellebore (*Veratrum woodii*), and Ozark spiderwort (*Tradescantia ozarkana*) have been documented in the vicinity of the proposed rim trail (Tucker, 1990a). With the exception of Ozark chinquapin and prickly gooseberry, no other PETS species were observed during the 1991 field survey of the proposed trail. However, the location and flagging of this proposed trail was completed at a time when vegetative growth and flowering had already passed. Therefore, loss of or reduction in population size of species not observed could occur as a result of trail construction and use. The loss of or reduction in population size of these PETS species can be avoided by rerouting the trail away from PETS species and by leaving a protecting vegetative buffer zone around the population.

All development alternatives include restricted use areas. The inclusion of these restricted use areas as an integral part of the administration of the park should be beneficial to all PETS species. Other positive benefits would be the environmental education/interpretive

programs and environmental monitoring by multiple agencies. Environmental programs should heighten awareness of the public concerning PETS species. In addition, the multiple agency monitoring could have immediate benefits to ensure the existence of PETS species and to formulate management guidelines to ensure their viability. Reduction of hunter access points from four to two locations should reduce the potential for man-made fires that could destroy habitat of some PETS species.

Permitted access for scientific study should play a major role in protecting PETS habitat and in reducing duplicative collection of scientific voucher specimen for PETS species which have already been documented numerous times.

4.5.6.2 Wildlife (Vertebrates)

No PETS species, with the exception of the rufous-crowned sparrow, have been recorded from any of the development areas or were seen during the 1991 field surveys. Effects on the rufous-crowned sparrow are likely if the old lodge site is selected for construction of the lodge/cabins complex. As discussed in detail in Section 3.9.3, the rufous-crowned sparrow is known to inhabit the plant community of the south bluffline. Construction activities, especially in the old cabin sites to the west of the old lodge site, may eliminate or modify a portion of the species' limited habitat. The sparrow has been described as primarily a ground nester. Construction activities could expose the nest, eggs, and chicks and increase predation by other vertebrates, cause the loss of nest sites, and/or cause the abandonment of nest sites. Wherever possible, avoidance of rufous-crowned sparrow habitat, or minimization of construction in its habitat, should be practiced. Habitat evaluation and species monitoring will be implemented prior to construction activities to identify species-specific habitat requirements (e.g., territory) and to recommend the amount of habitat to protect during construction and operation of the park.

Since the nesting/fledgling season would correspond with the peak visitor season, the rufous-crowned sparrow nests may be subject to trampling and destruction by foot traffic. According to studies (Carlson, personal communication 1992), the rufous-crowned sparrow will abandon its nest if subjected to heavy foot traffic. Since little is currently known about the population size and dynamics of the Mt. Magazine population, loss of nests, eggs, or chicks would reduce the population size on the Mountain. Identification of nest sites and/or approximate locations and visitor control during the nesting and fledgling season should reduce effects on this species.

Outside of its nesting season, this species will tolerate increased human activity; however, little is known of how this species will tolerate increased competition from other bird species that result from increased human activities. The cumulative effects of both the direct effects described above and the indirect effects of competition and displacement of the rufous-crowned sparrow by species known to be tolerant of human activities could affect the continued existence of the rufous-crowned sparrow population on Mt. Magazine.

4.5.6.3 Wildlife (Invertebrates)

No construction is planned in known areas of invertebrate PETS species. Thus, no invertebrate PETS species should be directly affected by this alternative. Routine operation and maintenance of the roadsides, specifically mowing or other means of vegetation and weed

control, has the potential to indirectly effect the Diana fritillary by removing the host plant species during the time of its use by this species. This potential effect can be avoided by changing mowing and weed control practices and schedules. Similar to Alternatives B and C, the establishment of a permit system for scientific study, of educational programs, of restricted areas on the Mountain, and of a multiagency monitoring and species management program should have beneficial effects on this butterfly. Elimination of unregulated collection should help ensure the continued existence of this species on Mt. Magazine.

The inclusion of restricted use areas, environmental education/interpretive programs, and environmental monitoring by multiple agencies should be beneficial to all other invertebrate PETS species on the Mountain. Environmental programs should heighten awareness of the public concerning invertebrate PETS species. The multiple agency monitoring should ensure the existence of other invertebrate PETS species on the Mountain.

Although no indirect effects on the Magazine Mountain shagreen snail (*Mesodon magazinensis*) are anticipated, protection of this species can be achieved via the implementation of the recovery plan for this species which is currently in draft form (Hartfield 1989). Reduction of hunter access areas from four to two under this and other alternatives should reduce the potential for man-made fires that could destroy critical habitat of some invertebrate PETS species.

4.5.7 Cultural Resources

No additional effects on cultural resources in areas described previously under Alternatives B and C are expected to occur under this alternative. With the proposed addition of the 19th century homestead and rim hiking trail, additional effects on cultural resources are anticipated as described below.

19th Century Homestead

The location of the proposed 19th century homestead across from the old lodge site, a 5-acre area located east of the loop road and at the base of the southern side of Signal Hill, was surveyed. No cultural resources were found at this location.

No cultural resources were found in the proposed homestead location overlooking Bear Hollow (see Section 4.4.7). Thus, no effects on cultural resources are anticipated at this location.

Hiking Trails

The 5.8-mile rim trail proposed under this alternative will not directly affect significant cultural resources on the Mountain, except at the trail heads. Indirect impacts may occur at sites located on either side of the trail. Multiple agency monitoring of these sites, provided for under this alternative, can identify if destruction of these sites is occurring from trail use, and recommendations for rerouting can be made. If monitoring and protection of the sites occurs during construction and use of the trail, then cultural resources should not be affected. Monitoring and protection of the sites, therefore, will be necessary to minimize effects on these sites.

In addition, 2 miles of the existing historic Will Apples Road (49-42) was surveyed. This road is potentially eligible and may be suitable for use as a hiking and horse trail as long as the archeological resources (house sites, school, springs, and rockwork) on each side of the road are monitored and not disturbed.

4.5.8 Socioeconomics

Table 4.3 presents the estimated change in economic variables for Alternative D. These economic estimates were calculated as previously described under Alternative B.

Under Alternative D, both short- and long-term effects increase as the size of the development increases (Table 4.3). This applies to both the initial construction phase and the tourism expenditure level. There are anticipated diminishing returns to all the project alternatives, which are probably more applicable to the tourism levels than to the construction levels. These influences of the law of diminishing marginal returns have been included in the process of estimating the annual level of tourism expenditures expected within the primary impact area.

Human and material resources, as well as power and energy, are required to design, construct, operate, and maintain all of the improvements for this alternative. Under Alternative D, first costs are estimated to be \$13,386,350 (lodge overlooking Bear Hollow) or \$13,412,410 (old lodge site), depending on the selected location of the lodge. Annual operation and maintenance costs are estimated to be \$1,242,180. Cost estimating methodologies and detailed lists of estimated first costs and annual costs for each of the alternatives are included in Appendix F, Part III. First cost commitments for each alternative include construction, architectural, engineering, and planning costs. Annual cost commitments for each alternative include personnel, water, electric energy, chemicals, vehicle use (including the consumption of oil and gasoline), telephone service, insurance, solid waste disposal service, water, and other miscellaneous expenses.

Similar to other State projects, first costs required by Alternative D will be provided by the State of Arkansas. A portion of the annual costs are expected to be recovered through park revenues. The commitment of the resources themselves (energy, oil and gas), however, is irretrievable.

From an engineering perspective, there is no discernible difference between locating the lodge, cabins, and related facilities at either the original lodge site or at the lodge location overlooking Bear Hollow. The human, economic, and material resources required to develop either site are essentially the same as shown in the cost estimates in Appendix F.

The method used to estimate revenues and profits for the various levels of development is described in Appendix E, Part II. The total estimated yearly revenue under Alternative D is \$1,392,000 and the estimated yearly net accounting profit is \$487,000. The average estimated range of visitation to Mt. Magazine under this alternative is 227,000 to 265,000 annually.

4.5.9 Opportunities for Public Use

Recreational opportunities would further improve under Alternative D with additional and improved picnic areas and camp units, additional trail mileage, a 19th century homestead, and a swimming pool. The overnight capacity of the mountaintop and its attractiveness to a more diversified population would be increased by the addition of more camp units, a lodge, a

Table 4.3. Estimated economic effects to the primary impact area of Mt. Magazine for Alternative D¹.

	Change in Gross Sales ²	Change in Employment ³	Change in Total Wages and Salaries
Short-Term ⁴ Direct Effect	\$13.3 mil	n/a	n/a
Short-Term Indirect Effect	\$7.4 mil	n/a	n/a
Short-Term Total Effect	\$20.7 mil	87	\$3.9 mil
Long-Term ⁵ Direct Effect	\$6.4 mil	n/a	n/a
Long-Term Indirect Effect	\$3.6 mil	n/a	n/a
Long-Term Total Effect	\$10.0 mil	119	\$1.9 mil

¹ Estimated construction cost is \$13.3 million and the estimated total annual expenditure for this alternative is \$6.4 million.

² Computed from the gross sales multiplier.

³ Estimated additions to the total number of jobs in the primary impact area (Logan and Yell Counties).

⁴ Short-Term effects are associated with the construction phase of the project.

⁵ Long-Term effects are associated with tourist expenditures and are estimated on a yearly basis.

n/a Not applicable. The estimated economic effects are isolated into direct and indirect effects only for changes in gross sales.

Note: Refer to Appendix E, Part II for economic model used to compute changes in gross sales, employment, and wages and salaries.

restaurant, and a visitor information center. The presence of the lodge and cabins on Mt. Magazine is expected to increase visitation and recreational use of the Mountain. Day use of the Mountain is also expected to increase because of the addition of new facilities and trails described above. With enhanced recreational facilities, the opportunity for recreation based on solitude would be decreased, but not eliminated. Recreationists seeking undeveloped areas for solitude may find certain areas on Mt. Magazine no longer meet their needs. Additionally, the development level of the mountaintop under this alternative may require additional lighting at night that may cause concomitant light pollution. Under this alternative, the mountaintop may be less desirable for use by local astronomers, even though new recreational opportunities for astronomers will be made available through the addition of an astronomical lookout area.

This alternative also provides for the development of educational opportunities, which includes interpretive programs and displays in the visitor information center. Educational opportunities and interpretive programs should have a long-term beneficial effect on the use of the Mountain and the protection of its resources.

Areas of restricted use will be established to preserve the elements of the Mountain's ecosystem. Restricted use areas should provide a balance between increased use and the long-term protection of the Mountain's resources. The designation of restricted use areas on the Mountain and the reduction of hunter access areas by one-half may inconvenience hunters but should not eliminate use of the slopes by hunters. Access to the slopes is available from the base or sides of the Mountain. Use of a permit system for scientific research and for access into restricted areas should prevent duplicate collection of specimens for which numerous collections have been made, will ensure the collection of compatible data and information to inventory the Mountain's resources and to identify patterns and trends in resource condition, and will regulate disturbances to resources and maintain resource health and viability.

Short-term impacts on recreational activities are likely during construction. Recreation is likely to be disrupted by noise, movement of heavy equipment, extra traffic, and temporary obstructions or restrictions. Visitation by curious citizens may also temporarily increase during construction.

Construction of facilities at the old lodge site may temporarily affect the rock climbing and hang gliding activities currently taking place along the south face of the Mountain. Rock climbing activities may be affected by operation and use of the facilities on the south side of the Mountain. Objects thrown over the bluffs by visitors to the Mountain can increase the hazards for rock climbers and decrease their safety. Hazards to rock climbers can be minimized and avoided through several options including, implementation of construction good-housekeeping practices, restriction of climbing activities during construction, signing near the bluffs to protect climber safety below, and establishment of a buffer zone along the bluffline in which construction workers and visitors are prohibited. Temporary loss of access to the hang gliding area during construction will be short-term and should affect neither the continued use of this site nor the safety of the hang gliders. Locating the lodge at Bear Hollow would not affect any of the current recreational uses.

It is likely that increased use resulting from the establishment of a state park on the plateau will eventually result in increased bear and human confrontations (Dr. Clark, personal

communication 1991). The majority of these encounters will involve the bears' search for food. Proper waste control measures (i.e., bear-proof garbage cans and control of solid waste) will minimize potential confrontations.

4.5.10 Aesthetics

The development proposed under this alternative will change how the recreation areas look and therefore will affect the aesthetics of the area. Approximately 59-60 acres of land are expected to be affected by a change in use. Whether these effects are considered to be positive or negative will mostly depend on the observer. Some other possible effects on the Mountain's aesthetics include:

- The clearing, materials storage areas, and heavy machinery that will be present during construction will be a visual intrusion on the aesthetics of the mountaintop; however, these activities are relatively short-term and the effect on aesthetics during the construction phase is not a major concern.
- A reduction in vandalism and improper disposal of trash with the presence of full-time personnel on the Mountain will increase the aesthetic quality of the mountaintop.
- The location of the lodge at the old site on the south rim would be considered aesthetically pleasing to some visitors; others may feel that it interferes with the grand view from the south rim.
- The location of the lodge under this alternative does affect the scenery as viewed from the two alternative lodge sites. The old lodge site on the south rim offers a panoramic view of the valley below. The Bear Hollow site offers a limited view, but may appeal to the visitor who likes a more rustic setting.
- The construction of new water line access roads and water line improvements will be a visual intrusion on the view from certain locations on the south side of the Mountain. While this intrusion will be a long-term intrusion on visual quality, it will lessen over time and will not be much greater than the visual intrusion of the existing power line corridor.

4.6 Alternative E

The greatest degree of development will occur under this alternative. In addition to the existing facilities, Alternative E includes the construction and operation of 20 camp units with water at the quarry camp area; 20-40 camp units with water at Cameron Bluff Campground; an increase in the number of picnic units at Greenfield and East End Picnic Areas; pavilions with restrooms at East End Picnic Area, Greenfield Picnic Area, and the proposed quarry camp area; bathhouses at both Cameron Bluff Campground and the proposed quarry horse camp; a visitor information center; toilets at the hang gliding, rock climbing, and other recreational areas; 10-20 cabins; 6 employee residences; a maintenance building; two amphitheaters; a recreation vehicle sanitary station; a 19th century homestead; 5.8 miles of hiking trails along the rim; and a 60-90 room lodge with restaurant, pool, and two tennis courts. Approximately 28 full-time employees and 11 state-owned vehicles are needed to manage, operate, and maintain the proposed state park under this alternative.

4.6.1 Soil, Water, and Air

4.6.1.1 Soil

Approximately 21 acres of land would be cleared, graded, and subject to heavy equipment traffic during construction under Alternative E. Construction of recreation facilities and utility lines under Alternative E would eliminate existing ground cover and result in either displacement or compaction of soils. Possible indirect effects of construction activities are the changes in drainage patterns from grading, erosion, and sedimentation. The proposed locations for facilities, however, are fairly flat or gently sloped; therefore, these indirect effects are expected to be temporary, minimal, and of little or no consequence. The water line, booster stations, and associated access road will be constructed over rough, steep terrain. Erosion may be expected to occur during construction because of the steep slope. To minimize erosion, land disturbances should be kept to a minimum and restabilization scheduled as soon as practical. Soil Conservation Service standards and specifications for erosion and sediment control should be used for the design and construction of erosion and sediment control measures. Mitigation measures are discussed in greater detail in Section 4.7.

The Universal Soil Loss Equation (Corbitt 1990), which is used by various resource and regulatory agencies to model soil erosion, was used in the impact analysis to estimate the amount of soil loss as a result of development under this alternative. Total soil loss after the completion of development proposed under Alternative E is estimated to be 297.2 tons per year, an increase in 2.9 tons per year over Alternative D. The average soil loss was estimated to be 3.9 tons per acre per year, an increase of 3.6 tons per acre per year over average soil loss before development. Most of the soil loss is attributable to the water line access road. This rate of sediment loss is not expected to have any long-term, cumulative downstream effects because the size of the affected area is relatively small compared to the size of the watersheds of receiving streams, and the intervening forested area would buffer streams from long-range transport of sediment. Additionally, the sediment would be distributed among several drainages. Effects can be further mitigated, for example, by grading and graveling access roads, and establishing grassed waterways and ditches along the access roads.

During operation and management of recreation facilities, the use of unpaved Forest Development Road 1606 on the west end of Mt. Magazine will be limited. By restricting the use of this road, erosion and sedimentation are minimized in this hydrologically sensitive area. In addition, restricted use of the area west of Brown Springs will minimize the number of people exploring the bluffs and traversing the low, creeping slopes above the rock faces; therefore, there will be no effect on the current rates of soil movement on these unstable slopes.

4.6.1.2 Water

The construction and on-going operation and maintenance of the proposed development under this alternative would result in increased stormwater runoff. Total increased storm flows were estimated to be approximately 22.4 cfs by applying the Rational Method and assuming a 3.5 inch per hour storm, which is the 100 yr. design storm. This total flow off the affected area would also be mixed with runoff from an even larger watershed area, and would be distributed among several discrete drainages; therefore, the actual runoff from the affected area would result

in an insignificant increase in flow in each drainage, and should not cause any significant cumulative effects downstream. Stormwater flows generated from the site will be managed in accordance with all applicable regulations.

Hydrocarbons and other compounds could be present in runoff from paved areas with vehicle traffic. The EPA conducted a national study of urban runoff and found a number of priority pollutants in stormwater (EPA, 1983). The U.S. Forest Service used the EPA data and applied it to an analysis of potential impacts from the existing road on Mt. Magazine upon the Magazine Mountain shagreen snail. Their calculations are based on the highest concentrations of constituents found in Little Rock, Arkansas, road runoff. This analysis demonstrated that road runoff mixed with runoff from the watershed area above the road and diluted stormwater contaminants well below the State numeric water quality criteria for aquatic life. The EPA study was conducted in a large urban area where there are significant percentages of residential, commercial and mixed use areas and pavement, and there is very little opportunity for stormwater dilution from undeveloped areas. In comparison the proposed development on Mt. Magazine will result in far less vehicle traffic, and the affected area is small (less than 3 percent) in comparison to a total 2,200 acre mountaintop. Runoff from areas affected by development is expected to be diluted by at least a factor of ten in each drainage basin. Thus, no significant downstream cumulative effects should result from these compounds.

The groundwater recharge area for known springs on the north side of the Mountain is located largely in the restricted area west of Brown Springs and will not be affected by development on Mt. Magazine. Reduction in recharge areas due to addition of impervious surface is less than 1 percent of the total available recharge area; therefore, reduction in recharge is expected to be minimal and of little or no consequence.

Construction of the water line and storage facilities will provide a year-round supply of water on the Mountain. It is anticipated the source of water will be the towns of Blue Mountain and Magazine. An additional 30,000 gallons per day of water will be provided by the City of Booneville to meet the increased water consumption needs under this alternative. Officials from these towns and the City of Booneville have indicated there should be sufficient water supply to meet the needs of Mt. Magazine and their respective customers.

Wastewater generated as a result of the proposed improvements will be treated and released off the Mountain. Approximately 23,800 gallons per day wastewater, an increase of 7,100 gallons per day over Alternative D, would be treated and discharged to either Big Shoal Creek (proposed lodge site overlooking Bear Hollow) or West Bass Creek (old lodge site), depending on the selected location of the lodge. In order to avoid discharging treated wastewater into the Special Interest Area, effluent may be hard piped for discharge to the approximate 1,600 ft elevation. Although it is unclear whether this mitigation measure will be needed, particularly for the wastewater treatment facility that would discharge off the south side of the mountain into West Bass Creek, provisions for hard piping the effluent are included in the cost estimates (Appendix F, Part III). The Arkansas Department of Parks and Tourism will apply for an NPDES permit to operate a wastewater treatment plant. In addition, the treatment facility would be expected to produce effluent of a quality that will comply with the discharge permit conditions; however, effluent will be oxygen demanding and containing nutrients such

as phosphorus and nitrogen. These nutrients will promote the growth of vegetation in proximity to the outfall of the discharge pipe. However, no significant downstream cumulative effects are expected from these discharges.

No additional effects on water beyond those described under Alternative D are expected to occur under this alternative.

4.6.1.3 Air

The proposed development would not degrade the ambient air quality and therefore, will have no effect on human health, vegetation, wildlife, and the environment in general. Dust may be raised during construction but can be controlled by spraying water on the soil and excavated material to keep it on the ground, graveling access roads, and covering soil and debris piled in open trucks.

Potential odors may arise from the wastewater treatment plant proposed under this alternative even when operated properly. Mitigating measures that could be used to reduce odor drift include use of a vegetated buffer zone around the wastewater treatment plant and locating the wastewater treatment plant away from high use visitor areas.

4.6.2 Vegetation

Under this alternative, a further increase in the amount of vegetation cleared for construction over Alternative D will occur. The amount of vegetation removal is the greatest under this alternative. No effects on the vegetation at Cameron Bluff Campground are expected to occur as a result of construction of additional camp units and facilities in the campground. The construction of the tennis courts at the old lodge site on the south side of the Mountain will further remove portions of the limited plant communities at that location. Increased fragmentation of the juniper-hardwood woodlands, xeric sandstone community, and the glade and prairie openings in the juniper-hardwood woodlands will occur. Effects on these communities and on their component species can be minimized by locating the park facilities and structures to maintain large areas of these communities. The effects of construction on the remaining flora of the Mountain should not be greater than those described under Alternative D.

Increased visitor use of the mountaintop and of the proposed facilities and recreational areas over Alternative D is expected under Alternative E. The effects of increased visitor use should be greatest on the vegetation at the old lodge site. Increased trampling of plants and displacement of native vegetation with weedy species most likely will occur. These effects, however, could be minimized with an increase in visitor and pedestrian control measures over those described previously for Alternatives B, C, and D.

No additional effects on the vegetation of Mt. Magazine beyond those described above and expected for Alternative D should occur as a result of operation, maintenance, and management activities under Alternative E.

4.6.3 Wetlands

As discussed in Section 4.3.3, no effects beyond those discussed under Alternative B are expected.

4.6.4 Wildlife (Vertebrates)

No additional effects on the resident and migrant vertebrate communities beyond those discussed previously are likely under this alternative, despite further increased acreage cleared and further increases in visitation. Increased displacement of resident populations immediately adjacent to new facilities (i.e., 19th century homestead, tennis courts, amphitheaters, bathhouses) is likely. Based on the type and locations of the new facilities, this displacement should not affect the continued existence of the vertebrate communities of Mt. Magazine.

4.6.5 Wildlife (Invertebrates)

No additional effects on invertebrate communities beyond those described under Alternative D are expected to occur under Alternative E.

4.6.6 Proposed Endangered, Threatened, and Sensitive (PETS) Species

4.6.6.1 Plants

The PETS plant species that could be affected by construction and use of the lodge, cabins, tennis courts, and other facilities at the old lodge site location include: Ouachita leadplant (*Amorpha ouachitensis*), Bush's poppy mallow (*Callirhoe papaver* var. *Bushii*), and broom nailwort (*Paronychia virginica* var. *scoparia*). While effects on the small-headed pipewort (*Ericaulon kornickianum*) are possible, this species may have already been extirpated from the Mountain. Bush's poppy mallow also may have been extirpated. No effects on the continued existence of the Ouachita leadplant on Mt. Magazine should occur because numerous individuals of this species occur elsewhere on the Mountain. Loss of individuals from the south side will be unavoidable under this alternative.

The broom nailwort has the greatest potential for being trampled and for experiencing a reduction in population size because of its location on ledges and pavement outcrops and its association with bedrock; and because visitor use of these areas is expected to increase under Alternative E. Increased control of visitor access to the ledges and outcrops via designated trails, designated overlooks, increased fencing and signing will be necessary to minimize adverse effects on this PETS species.

No additional effects on the PETS plant species in other areas of the mountaintop or in the water line and access road corridors beyond those described under Alternatives B, C, and D are expected to occur under this alternative.

4.6.6.2 Wildlife (Vertebrates)

The potential for an increased loss of rufous-crowned sparrow habitat is likely on the south side of the Mountain with the addition of the tennis courts under this alternative. The increased loss of habitat can be avoided if construction of the additional facilities is completed further up slope in the more xeric oak-hickory forest.

4.6.6.3 Wildlife (Invertebrates)

The development planned under this alternative option is not proposed in any critical habitat for invertebrate PETS species. As with Alternative D, no potential direct effects are expected to occur as a result of increased visitation. Any potential effects on the Magazine Mountain shagreen snail (*Mesodon magazinensis*) can be avoided or minimized through the

implementation of the recovery plan for this species, which is currently in draft form (Hartfield 1989). Effects on and benefits to the Diana fritillary (*Speyeria diana*) under this alternative should be similar to those described under Alternative D.

4.6.7 Cultural Resources

No additional effects on cultural resources beyond those described for areas under Alternative D are expected to occur under Alternative E.

4.6.8 Socioeconomics

Table 4.4 presents the estimated change in economic variables for Alternative E. These economic estimates were calculated as described under Alternative B. As can be seen by comparing Table 4.4, which summarizes economic effects for Alternative E, with Table 4.3 (Alternative D), effects of Alternative E are not expected to be significantly different from the effects under Alternative D.

Human and material resources, as well as power and energy, are required to design, construct, operate, and maintain all of the improvements proposed under this alternative. Under Alternative E, first costs are estimated to be \$17,431,690 (lodge overlooking Bear Hollow), or \$17,457,750 (old lodge site), depending on the selected location of the lodge. Annual operation and maintenance costs are estimated to be \$1,384,570. Cost estimating methodologies and detailed lists of estimated first costs and annual costs for each alternative are included in Appendix F, Part III. First cost commitments for each alternative include construction, architectural, engineering, and planning costs. Annual cost commitments for each alternative include personnel, water, electric energy, chemicals, vehicle use (including the consumption of oil and gasoline), telephone service, insurance, solid waste disposal service, water, and other miscellaneous expenses.

Similar to other State construction projects, first costs required by Alternative E will be provided by the State of Arkansas. A portion of the annual costs are expected to be recovered through park revenues. The commitment of the resources themselves (energy, oil and gas), however, is irretrievable.

From an engineering perspective, there is no discernible difference in locating the lodge, cabins, and related facilities at either the original lodge location or at the lodge location overlooking Bear Hollow. The human, economic, and material resources required to develop either site are essentially the same as shown in the cost estimates in Appendix F, Part III.

The method used to estimate revenues and profits for the various levels of development is described in Appendix E, Part II. The total estimated yearly revenue under Alternative E is \$2,160,000 and the estimated yearly net accounting profit is \$756,000. The average estimated range of annual visitation to Mt. Magazine for this alternative is 331,000 to 359,000.

4.6.9 Opportunities for Public Use

Greater opportunities for public use of the Mountain are expected under this alternative because of the increase in number of camp units, picnic units, lodge rooms, and cabins. Recreational opportunities would further improve under Alternative E with additional and improved picnic units and camp units, additional trail mileage, a 19th century homestead, and a swimming pool and tennis courts. The overnight capacity of the mountaintop and its

Table 4.4. Estimated economic effects to the primary impact area of Mt. Magazine for Alternative E¹.

	Change in Gross Sales ²	Change in Employment ³	Change in Total Wages and Salaries
Short-Term ⁴ Direct Effect	\$17.4 mil	n/a	n/a
Short-Term Indirect Effect	\$5.2 mil	n/a	n/a
Short-Term Total Effect	\$22.6 mil	179	\$5.1 mil
Long-Term ⁵ Direct Effect	\$8.1 mil	n/a	n/a
Long-Term Indirect Effect	\$4.5 mil	n/a	n/a
Long-Term Total Effect	\$12.6 mil	150	\$2.3 mil

¹ Estimated construction cost is \$17.4 million and the estimated total annual expenditure for this alternative is \$8.1 million.

² Computed from the gross sales multiplier.

³ Estimated additions to the total number of jobs in the primary impact area (Logan and Yell Counties).

⁴ Short-Term effects are associated with the construction phase of the project.

⁵ Long-Term effects are associated with tourist expenditures and are estimated on a yearly basis.

n/a Not applicable. The estimated economic effects are isolated into direct and indirect effects only for changes in gross sales.

Note: Refer to Appendix E, Part II for economic model used to compute changes in gross sales, employment, and wages and salaries.

attractiveness to a more diversified population would be increased by the addition of more camp units, a lodge, a restaurant, and a visitor information center. The presence of the lodge and cabins on Mt. Magazine is expected to increase visitation and recreational use of the Mountain. Day use of the Mountain is also expected to increase because of the addition of new facilities and trails described above. With enhanced recreational facilities, the opportunity for recreation based on solitude would be decreased, but not eliminated. Recreationists seeking undeveloped areas for solitude may find certain areas on Mt. Magazine no longer meet their needs. Additionally, the development level of the mountaintop under this alternative may require additional lighting at night that may cause concomitant light pollution. Under this alternative, the mountaintop may be less desirable for use by local astronomers, even though new recreational opportunities for astronomers will be made available through the addition of an astronomical lookout area.

This alternative also provides for the development of educational opportunities, which includes interpretive programs and displays in the visitor information center. Educational opportunities and interpretive programs should have a long-term beneficial effect on the use of the Mountain and the protection of its resources.

Areas of restricted use will be established to preserve the elements of the Mountain's ecosystem. Restricted use areas should provide a balance between increased use and the long-term protection of the Mountain's resources. The designation of restricted use areas on the Mountain and the reduction of hunter access areas by one-half may inconvenience hunters but should not eliminate use of the slopes by hunters. Access to the slopes is available from the base or sides of the Mountain. Use of a permit system for scientific research and for access into restricted areas should prevent duplicate collection of specimens for which numerous collections have been made, will ensure the collection of compatible data and information to inventory the Mountain's resources and to identify patterns and trends in resource condition, and will regulate disturbances to resources and maintain resource health and viability.

Short-term impacts on recreational activities are likely during construction. Recreation is likely to be disrupted by noise, movement of heavy equipment, extra traffic, and temporary obstructions or restrictions. Visitation by curious citizens may also temporarily increase during construction.

Construction of facilities at the old lodge site may temporarily affect the rock climbing and hang gliding activities currently taking place along the south face of the Mountain. Rock climbing activities may be affected by operation and use of the proposed facilities on the south side of the Mountain. Objects thrown over the bluffs by visitors to the Mountain can increase the hazards for and decrease the safety of rock climbers. Hazards to rock climbers can be minimized and avoided through several options including, implementation of construction good-housekeeping practices, restriction of climbing activities during construction, signing near the bluffs to protect climber safety below, and establishment of a buffer zone along the bluffline in which construction workers and visitors are prohibited. Temporary loss of access to the hang gliding area during construction will be short-term and should affect neither the continued use of this site nor the safety of the hang gliders. Locating the lodge at Bear Hollow would not affect any of the current recreational uses.

It is likely that increased use resulting from the establishment of a state park on the plateau will eventually result in increased bear and human confrontations (Dr. Clark, personal

communication 1991). The majority of these encounters will involve the bears' search for food. Proper waste control measures (i.e., bear-proof garbage cans and control of solid waste) will minimize potential confrontations.

4.6.10 Aesthetics

The development proposed under these alternatives will change how the recreation areas look and therefore will affect the aesthetics of the area. Approximately 71-72 acres of land would be affected by a change in use. Whether these effects are considered to be positive or negative will mostly depend on the observer. No additional effects on the Mountain's aesthetics beyond those described under Alternative D are expected to occur under this alternative.

4.7 Mitigation Measures

Unavoidable effects on Mt. Magazine's natural physical environment, vegetation wildlife, PETS species, cultural resources, and social environment can be lessened through management practices. While the level or intensity of these management or mitigation practices will vary between the alternatives, implementation of these measures will assist in balancing the effects of development of the proposed state park with the long-term, continued protection and maintenance of the resources on Mt. Magazine. The following is a summary of the general mitigation measures that apply to Alternatives B through E:

- 1) To minimize erosion, land disturbance will be kept to a minimum, and restabilization of soil and ground cover will be scheduled as soon as is practical. Soil Conservation Service standards and specifications for erosion and sediment control will be used for the design and construction of erosion and sediment control measures.
- 2) Stakes and flags will be installed before clearing and excavation work begins to identify the limits of work areas and prevent unnecessary disturbances to land, soil, vegetation, wildlife, and other resources. All work areas except road surfaces and parking areas will be protected by gravel paving or by temporary mulching and vegetative cover. Access roads, laydown areas, and other on-site disturbed areas will be graded to maintain existing topography and natural drainage patterns.
- 3) Topsoil will be protected to provide good soil to support growth of natural vegetation. When needed, mitigation of soil compaction and rutting will be required as appropriate through dicing, chiseling, grading, or leveling. Other disturbed areas will be landscaped or reseeded.
- 4) The Arkansas Department of Parks and Tourism will develop a revegetation/erosion/sedimentation control plan after a design plan is obtained. This plan will stipulate the specific mitigation measures that will be used in each area, including contouring and terracing, and run-on and run-off control through berms, ditches, slope stabilization and reseeded or sodding.

- 5) Stormwater flows generated from the site will be managed in accordance with all applicable stormwater regulations. Construction activities at the site will be conducted pursuant to the provisions of the authorized NPDES program of the ADPCE and of any permits issued under this program.
- 6) PETS plant locations will be protected with a 60-foot buffer during construction and operating activities. If PETS plant species cannot be avoided, relocation or possible loss of individual plants may occur only on a case by case basis with clearance by the U.S. Forest Service.
- 7) The Arkansas Department of Parks and Tourism will provide monitoring and on-site enforcement during all phases of construction and operation of heavy equipment to protect sensitive species habitat and limited plant communities, and to prevent excessive and unnecessary effects on the vegetation and species habitats on the Mountain.
- 8) No construction activities will occur during April-June within the area known to be inhabited by the rufous-crowned sparrow.
- 9) Habitat evaluation and monitoring will be implemented prior to construction to identify specific habitat requirements of the rufous crowned sparrow (e.g., territory) and to recommend the amount of habitat to protect during construction and operation.
- 10) New trails will be located 60 feet away from PETS plant species. Accepted trail design and construction techniques will be used, including use of waterbars, bridges, and proper tread construction.
- 11) Signing and enforcement will be used to reduce foot traffic along specific bluff lines and rock outcrops where some PETS species occur. A gate will be placed as shown on Figures 2.2 through 2.5 to control vehicular access and foot traffic to the west end of the Mountain where several PETS species are known to occur.
- 12) Signing and designated walkways for pedestrian traffic will be used to reduce disturbance within the breeding territories of the rufous crowned sparrow.
- 13) Roadsides and other areas containing the plant species critical for the reproduction of or as a food source for the Diana fritillary butterfly will not be mowed during the reproductive and feeding times of this species, and the collection or study of this butterfly will be strictly regulated to promote the continued existence of this species on Mt. Magazine.
- 14) The U.S. Forest Service, together with cooperating agencies, will continue to develop and implement conservation management guidelines for PETS plant species that currently do not have management guidelines.
- 15) Control of nuisance plant species and insect infestations in the vicinity of the facilities will be accomplished using methods least obtrusive to non-target species. Mechanical means will be emphasized over the use of pesticides. No pesticides will be applied within 60 feet of PETS species without site specific analysis.
- 16) Sites identified by the archeological survey completed for this project will be evaluated for their potential National Register eligibility through archival research, archeological testing, and/or as mutually determined by the SHPO and the U.S. Forest Service. All archeological work will follow standards in *A State*

Plan for the Conservation of Archeological Resources in Arkansas (Davis 1982), the Secretary of the Interior's Standards, the *Guidelines for Archeology and Historic Preservation* (48FR44716), and *A Foundation for the Future: Arkansas Historic Preservation Plan*. A qualified archeologist meeting the Secretary of the Interior's professional qualification standards will be used to conduct the archeological studies.

- 17) All sites which are found to be eligible for inclusion in the National Register will be recommended for protection and preservation. However, if National Register eligible sites cannot be avoided, adverse effects of the proposed project on historic properties will be mitigated. Mitigation may include data recovery on archeological sites and reconstruction, full archival documentation, or incorporating historic features into the proposed facility design for other properties. A mitigation/preservation plan for properties eligible for inclusion in the National Register of Historic Places will be approved by the Arkansas Historic Preservation Program (AHPP), the Advisory council on Historic Preservation, and the U.S. Forest Service. This plan will be in the form of a Memorandum of Agreement with a treatment plan for historic properties.
- 18) If construction plans are changed to affect areas not inside the areas surveyed, a map and project description will be sent to the Arkansas Historic Preservation Program and the U.S. Forest Service prior to implementation of the project. AHPP will be afforded the opportunity to review and comment on the proposed plans as per the regulations of the Advisory council on Historic Preservation (36CFR part 800) as authorized under the National Historic Preservation Act.
- 19) Disturbance of all known graves will be avoided. If burials (historic or prehistoric) are encountered during archeological excavation or construction, the Guidelines of the Advisory Council on Historic Preservation procedures set forth in Policy Interpretation Memorandum 89-1 (ACHP 1988a&b), the Native American Grave Protection and Repatriation Act (NAGPRA), and the Arkansas Burial Law (Act 753) will be followed.
- 20) All construction materials, including borrow or fill dirt, which may be procured from sources off the Mountain, will be obtained from areas which have been surveyed and given archeological clearance by the State (ACHP 1988a&b).
- 21) In conjunction with Memorandum of Agreement (MOA), a Treatment Plan for Historic Properties in the park on Mt. Magazine will be developed to preserve, protect and mitigate adverse effects on historic properties.
- 22) A program to educate the public concerning the significance of the information contained in the historic and prehistoric sites will be developed to increase protection of these sites.
- 23) Shielded and/or sodium arc lighting will be used to minimize light pollution interference with astronomic observations.
- 24) Good-housekeeping practices during construction will be maintained to minimize aesthetic effects.
- 25) Efforts will be made to mitigate the aesthetic effects of developing the proposed park area through the use of appropriate architecture and landscaping.

- 26) Wastewater will be hard piped to the 1,600 ft elevation to minimize affects on biological communities of the Mountain.
- 27) To minimize leakage in the water line, a 4-inch ductile iron pipe will be utilized from the tank and booster station at the 700 ft elevation to the booster station at the top of Mt. Magazine. To help booster station reliability, each station will have two pumps, each capable of pumping the desired amount of water.
- 28) Signing and fencing of aesthetically pleasing appearance will be used where appropriate to minimize the potential for accidents associated with steep bluffs for visitor protection.
- 29) To minimize total acres to be disturbed through construction activities, the 19th century homestead will be limited to no more than 2 acres in size.
- 30) Those park employees who commute to work will be encouraged to car-pool as a fuel-saving measure.
- 31) The Arkansas Department of Parks and Tourism and the Forest Service will prepare a Resource Management Plan, for operation of the park, which emphasizes cooperation and effective use of public funds for law enforcement, education, interpretation, wildfire suppression, and habitat improvements.

5.0 LIST OF PREPARERS

Lisa C. Gandy - team coordinator, plant ecologist

PhD, Botany/Terrestrial Plant Ecology, University of California, Riverside

Dr. Gandy has over 11 years experience in plant ecology and in environmental impact assessment. She has specialized in assessing the impacts of development and pollutants on the environment and on biological systems. Specifically, she has assessed the impacts of industrial, commercial, and residential development and the effects of recreation, grazing, and hazardous chemicals on terrestrial plant communities, on wetlands, and on threatened and endangered species. Dr. Gandy has worked with federal agencies, conservation organizations, and private landowners to develop management and protection strategies for threatened and endangered species.

Charles R. Britton - socioeconomics

PhD, Economics, University of Iowa

Dr. Britton is a Professor of Economics at the University of Arkansas at Fayetteville with extensive experience in economic analysis and assessment of economic impacts associated with environmental, social, and demographic issues. Specific experience and projects include studies of the quality of life and resources development, fiscal impacts of retirees on local areas in Ozarks, the impacts of energy constraints on Arkansas tourism, and drought effects on the agricultural economy of the Southeastern United States. Dr. Britton has attended continuing education courses on Social Impact Assessment sponsored by the National Science Foundation. Dr. Britton's teaching experience includes undergraduate courses in economic development, principles of macroeconomics, basic economics, and economic fluctuations, and graduate courses in economic growth and development and macroeconomic theory.

Ronald S. Caldwell - invertebrates

PhD, Zoology, Auburn University

Dr. Caldwell has approximately 17 years of experience teaching biological sciences and conducting biological research, both inside and outside Arkansas. He evaluated the status of *Mesodon magazinensis*, the Magazine Mountain shagreen, under the Nongame Species Preservation Program of the State of Arkansas and he is actively involved in the survey and habitat analysis of other rare snails.

Richard K. Ford - socioeconomics

PhD, Economics, University of Arkansas at Fayetteville

Dr. Richard Ford is an Associate Professor of Economics at the University of Arkansas at Little Rock with over 12 years of experience in economic analysis, accounting and statistics. He has over 30 publications and has presented over 10 papers at professional meetings and conferences. Dr. Ford's experience and work includes economic analysis of single user composite pricing problems, estimation of composite demand for a pricing policy charge for the U.S. Army Corps of Engineers, industrial implications of the Surface Mining Control and Reclamation Act of 1977, the estimation of water demand functions, an economic analysis of growth and development of nine south-central counties in Arkansas, regional estimates of

domestic urban water demand schedules in Arkansas, and the development of an objective method of estimating costs based on markets. Dr. Ford's teaching experience includes courses in economic principles, statistical analysis, public finance, quantitative methods in accounting, business and economics, social values and economic society, and microeconomic theory.

Christina R. Laurin - recreation, aesthetics

BS, Environmental Health Science, University of Arkansas at Little Rock

Ms. Laurin has 2 years experience in the environmental sciences. She has had training in environmental impact assessment and has a working knowledge of the NEPA regulations. As an undergraduate student, she participated in scientific studies on Mt. Magazine.

Roland E. McDaniel - vertebrates, water quality

BS, Wildlife & Fisheries, University of Arkansas at Monticello,

MS Biology/Aquatic Ecology, Arkansas State University

Mr. McDaniel has over 11 years experience in environmental impact assessments and statements, all within Arkansas. He has worked with state, federal, and quasi governmental groups to develop impact assessments on a variety of environmental problems. Those duties have included roles as principal investigator, preparer, and reviewer. Mr. McDaniel has extensive experience in habitat characterization and evaluation. He has completed training by the U.S. Fish and Wildlife Service, National Ecology Research Center in the use of Habitat Evaluation Procedures (HEP), a tool to evaluate habitat quality, and the use of HEP in conducting mitigation analysis.

Mr. McDaniel has over 10 years experience in water quality assessments and was employed previously by the Arkansas Department of Pollution Control and Ecology, Water Division.

Stewart Noland - engineering analysis, soils, hydrology

MS, P.E. Civil Engineering, University of Arkansas at Fayetteville

Stewart Noland is a registered professional civil engineer in Arkansas with over 16 years experience in municipal, industrial, and utility engineering planning; analysis and feasibility assessment, and design and construction management. He has prepared preliminary design plans, environmental studies and reports, final design plans and specifications, and he has managed the construction of numerous water and wastewater collection, pumping, distribution and treatment systems for municipal and industrial clients. He has conducted a preliminary economic feasibility assessment of the Dardanelle and Norfolk hydroelectric projects for the Conway Corporation. Mr. Noland has also prepared cost estimates, analyzed site development constraints, and prepared public information programs for projects requiring local, state, and federal review. He is a member of the National Society of Professional Engineers, Past President of the Central Arkansas Chapter of the Arkansas Society of Professional Engineers, President of the Ozark Society, and a member of the Arkansas Heritage Fund.

Carol S. Spears - cultural resources, archaeology

MA, Anthropology, University of Arkansas of Fayetteville

Carol S. Spears is an archeologist and the owner of Spears Professional Environmental and Archeological Research Service (SPEARS). She is a certified Professional Archeologist with over 20 years of experience in cultural resource management and archeological projects in Arkansas, Missouri, Oklahoma, North Carolina, Illinois, and Yugoslavia. She has directed over 50 projects and has authored or co-authored approximately 60 technical reports, many of which were for Environmental Assessments and Impact Studies. Ms. Spears has a current "Special Use Permit" for Cultural Resource surveys and testing projects on the Ozark-St. Francis National Forest (Holder #5130-01).

Jane L. Spellman - geology, groundwater

MS, Hydrogeology, University of Arkansas at Fayetteville

Ms. Spellman is a registered professional geologist in Arkansas and has over 12 years experience in groundwater studies and environmental impact assessments. She has participated in projects involving construction of dams and reservoirs, the development of recreation areas, hydroelectric plant relicensing, and remediation of hazardous waste sites. Ms. Spellman is currently Vice President of the Arkansas Groundwater Association and editor of the Association's book (in preparation) on the State's groundwater resources.

Gary E. Tucker - botany/plant ecology, threatened and endangered (PETS) species

PhD, Botany/Plant Ecology, University of Arkansas, Fayetteville

Dr. Tucker has over 25 years of research experience with plant communities in Arkansas, including two major studies on plant species of Mt. Magazine. He is a former Endangered Species Coordinator and program manager for special-status species on the Ozark-St. Francis National Forests. Other areas of expertise include wetland science and the effects of disturbance on natural communities.

6.0 LISTS OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THIS STATEMENT WILL BE SENT

Mr. Harold Grimmett, Director, Ark. Natural Heritage Commission

Ms. Mina Marsh, Deputy Director, Ark. Natural Heritage Commission

Mr. John Beneke, Chief of Stwdshp., Ark. Natural Heritage Commission

Mr. Bill Shepherd, Planning Spec., Ark. Natural Heritage Commission

Mr. Tom Foti, Chief of Research, Ark. Natural Heritage Commission

Mr. Craig K. Uyeda, Chief R&B Sect., Arkansas Game & Fish Commission

Mr. Garner Barnum, Asst. State For., Arkansas Forestry Commission

Mr. Rex Roberg, Endangered Species, Arkansas Game & Fish Commission

Mr. Dick Casset, Chief, Tech. Serv., Pollution Control & Ecology

Mr. Glen Wilks, Arkansas Game & Fish Commission

Mr. David Slagle

Mr. Joe Wallace, Rec. Staff Officer, Ozark-St. Francis National Forests

Mr. Gerald Key, Lands Officer, Ozark-St. Francis National Forests

Mr. Gary Hartman, Biologist, Ozark-St. Francis National Forests

Mr. Bobby Roberson, Dist. Ranger, U.S. Forest Ser., Mt. Magazine Dist

Mr. Malcolm Gramley, Rec. Planner, U.S. Forest Ser., Mt. Magazine Dist

Mr. Jim Nipper, U.S. Fish & Wildlife Service

Honorable Frank Willems, State Representative, Dist. 30

The Honorable Lloyd George, State Representative, Dist. 40

The Honorable Luther Hardin, State Senator, Dist. 8

The Honorable Bill Walters, State Senator, Dist. 14

The Honorable Dale Bumpers, United States Senator

The Honorable David Pryor, United States Senator

The Honorable Bill Roberts, Logan County Judge

The Honorable James Lee Witt, Yell County Judge

Ms. Nancy Delamar, Director, Arkansas Nature Conservancy

Mr. Lance Peacock, Asst.Dir., Protec., Arkansas Nature Conservancy

Mr. John Williams, Co-Chairman, Mt. Magazine Development Committee

Mr. Butch Wade, Co-Chairman, Mt. Magazine Development Committee

Mr. Mike Crowell, President, Ozark Outdoor Supply

Ms. Lisa Hlass, Conservation Chair., Arkansas Audobon Society

Mr. Larry Haney, National Hang-Gliding Association

Mr. Phillip Reed, National Hang-Gliding Association

Dr. Robert T. Allen, University of Delaware

Mr. Bill Paxton, U.S. Forest Ser., Winona District

Mr. Allen Mueller, Field Supervisor, U.S. Fish & Wildlife Service

Mr. George McCluskey, Arkansas Historic Preservation Program

Mr. Rob Kopack, U.S. Forest Ser., Mt. Magazine Dist

Mr. Jack Fortin, Planning Staff Off, U.S. Forest Service Ozark-St. Francis Forests

Mr. Charles Cremeen, Arkansas Conservation Coalition

Ms. Connie Fox, Area Coordinator, Arkansas River Valley Area Council

Mr. Richard Mason, President, Arkansas Wildlife Federation

Ms. Judy Gallman, Arkansas Times

Mr. Bruce Ewing, Past President, Arkansas Native Plant Society

Mr. J. Randy Young, Director, Arkansas Soil & Water Cons. Comm.

Dr. Victor K. Vere, Prof. of Geol., School of Physical & Life Sciences, Arkansas Tech University

Mark Barnhard

Stephen C. Blair

Terri A. Jones, Executive Vice-President, Dardanelle Chamber of Commerce

Garvin Green

Robert W. Griffith

W. Q. Hall

Terri C. Hall

Bobbi E. Hill, President, League of Women Voters in Arkansas

Ervin and Ruth Lewis

Darlene Cree, Manager, Morrilton Chamber of Commerce

Clinton Richburg, President, North Logan County Farm Bureau

Harmon L. Rummel

Deborah Robinson

Mabel Roseborough

Dr. George Johnson, Arkansas Tech University, Department of Biology

Dr. Gary Ross

George & Elizabeth Fink

Dr. Chris Carlton, PhD, Museum Curator, Department of Entomology, University of Arkansas

Mr. Roger Burke

Barbara Moorman

John & Peggy Hutchcroft

Sarah Jones

Matthew Gallagher, President Arkansas Herpetological Society

Rusty Myers, Director of Economic Development, Wester Arkansas Planning & Development District, Inc.

Jan Nielsen, Jeremiah & Nielsen Attorneys at Law

Sylvia Geddes

Jody Paul Walters

Pam Beheshti

Fran Rogers

Paula Bragg

Scott Hahmuth

Laura Chenowith

Fred & Gabriela Kinslow

Tammy Booher

Carolyn Tomlin

Beulah Byers

Juanita Hunt

Rick & Beth Wright

Grace Keller

Jane Clawson

Malinda Brown

Michael Duncan

Bruce & Susi Onasch

Jill Smith

George Oleson, Sierra Club Arkansas Chapter

Mrs. R. H. Davis, Astromonic Society of NW Arkansas

Marilyn Thompson, Arkansas/Oklahoma Astronomic Society

Drew Phillips

Paul Williams Jr, Attorney at Law

Mary Ferguson

William Prior

Melvin Dunn

Lippard and Mueller, Attorneys at Law

Tony & Susan Morris

Rick Boyles

Rick Oliver

Carl Freyaldenhoven

Jim & Audrey Stanley

Bruce Kirkpatrick

Linda Blackwell, League of Women Voters

Chuck & Harriet Cremeen, Arkansas Conservation Coalition

Charles & Betty Selman, Mt Magazine Association

Randolph Mowry, Audubon Society of Central Arkansas

Ken Brazil, ASWCC

Jana Britton

Thomas Riley, Entomologist, Louisiana State University

Vicki Lyons, North Logan County Chamber of Commerce

April Hargis

Ed Shinn, Arkansas Trail Riders

Raymond & Sandra Powell

Bently Allen

Bill Mitchell, Mt Magazine Association

Joe & Holly Strack

Margret Stein-Friday

Nan Lawler

Dale Jones, Assistant Lumber Yard Supervisor, DeSoto Hardwood Flooring Co

Glen Wilks

Terrel Gordon

Geoff & Leslie Oelsner

A. C. Moncrief, Executive Director Franklin/ Logan Industrial Development Corp

John Keith Olsen, President Booneville Chamber of Commerce

Carol Woods

Stewart Webb

Keith & Glenna Dennie

Ronnie Hilton

Martha Edwards

Mary Potter

G. Denniston

T. Elliot

R. Rouse

Mary Edgmon

Troy Taylor

Carrie Powell

Mike Denniston

Lexie Collier

Dr. James Shearer

Mr. Jim Steele

Mr. Thurman Jordan

Mr. Rick Lippard

Mr. Don Dunn

Allison Wooldridge

Margret Hudson

Bob Adkinson

John S Workman

Lou Vitale, Arkansas River Valley Tourist Association

Gene & Charlotte Davis

Ron Russell, Fort Smith Chamber of Commerce

Nancy Clark

Buzz Kitchens

Don Floyd

Roger Smith

Mark Stump, Ozark Mountain & Fort Smith Hanggliding Association

Fred Baker, Jr.

Randy Bottoms

Martha Walz

The Honorable John Paul Hammerschmidt, US Representative

Lynn Spradley, President, Scenic Highway 7 Tourism Association

Ernie Deaton, President, Russellville Chamber of Commerce

Charles P. Van Epps

Dr. Lee A. Barclay, Field Supervisor US Department of the Interior Fish and Wildlife Service

Paul L. Redfearn, Jr., Emeritus Professor of Biology, Southwest Missouri State Univ.

Edward E. Dale, Jr., Plant Ecologist, University of Arkansas at Fayetteville

Dr. William J. Hess, Herbarium Curator, The Morton Arboretum

Douglas James, Department of Zoology, University of Arkansas at Fayetteville

Robert Reames, US Forest Service

Gary Bolin

L. L. Whitaker

Jack Vaughn

Dottie Neumeier

Coy J. Rush, Jr., Attorney at Law

Joyce McGowan, Booneville Democrat

Cissie Boyd, North Logan County Chamber of Commerce

Don Hall

Radine Nehring

Lori Bernard

David Edwards

Arthur Stern, Conservation Chairman, Three Rivers Audubon Society

Clementine Moore, Past President, Arkansas Native Plant Society

Thomas J. Simmons

David W. Hill

Jim Rawlins

Naif S. Khoury, Attorney at Law

Teresa Turk

Florence Mallard, Arkansas Audubon Society

Barry Haas, Arkansas Audubon Society

Richard Speairs, President, Arkansas Native Plant Society

Nancy Edwards

Dennis Daniel, U.S. Forest Service

Dela Beck, U.S. Forest Service

Meira Crawford, U.S. Forest Service

Steve Bearen, U.S. Geologic Survey

Ken Smith, Governor's Office

Bill Grist, Logan County Judge

Sharon Woffard

David Brown

Buddy Johnson

Howard Corder

Ronnie Easley

Jonathan Miller

Steward Scoggin

Tony Morris

Becky Cahoon

Steve Flanagan

Greg Hollis

Cleece Silvers

Sheila Meyers

Thruston Thompson

Tod Richardson

Richard Gordon

Martha Noble

Robert Wight

Barron McKinley

Charles Kirsbel

Dr. Clarence Mannasmith

Carolyn Boulden

Vernon Bates

Richard Boyles

Larry Porter

Roy Bilheimer

John Casey

Arthur Trusty

John Flatte

Steve Heye

Margaret Hudson

Dale Jones

Tennie Dale Keeton

John C. Lee
Roy Lloyd
Sue Lloyd
James McMath
Andrew Miller
Susan Murray
Trevor Myers
Merrill Osborn
Charles Pearson
Charlotte Quattlebaum
Harmon Remmel
Richard Savage
Lula Smith
Bill Talbert
Glyn Turnipseed
Jo Westlake-McVay
George White
Jewell White
Milton White
Fann Woodward
Gerald Otmer
B. J. Wynne
Bob Yandell
Mark Huber, Paris Alderman
Emogene Clard
Jason Rolfe

Valorie Anderson

Logan County Library, Booneville

Yell County Library, Danville

Arkansas River Valley Regional Library, Dardanelle

Fort Smith Public Library, Fort Smith

Garland County Library, Hot Springs

Central Arkansas Library, Main Library, Little Rock

Polk County Library, Mena

Johnson County Public Library, Clarksville

Conway County Library, Morrilton

Boyd T. and Mollie Gattis, Logan County Library, Paris

Pope County Library, Russellville

Scott County Library, Waldron

7.0 PUBLIC PARTICIPATION

This section presents an analysis and summary of the written and oral responses to the DEIS and of the demographics of the respondents. Appendix G contains copies of the written comments to the DEIS and the transcripts of the oral comments.

7.1 Written Comments

Tables 7.1 and 7.2 summarize the demographics of the respondents who submitted written comments. Table 7.1 lists respondent development preferences in relation to location of respondent residences, while Table 7.2 lists them in relation respondent affiliations.

7.1.1 Location of Respondent Residences

Thirty-four percent (21 of 61) of the respondents reside within the primary and secondary areas of economic impact for the proposed state park on Mt. Magazine. The total area of economic impact includes Logan, Yell, Franklin, Johnson, and Scott Counties; respondents from within that area are from Booneville, Dardanelle, and Paris, AR. The rest of the respondents reside throughout Arkansas with the exception of four out-of-state respondents: two from Louisiana, one from Texas, and one from Mississippi.

Nearly 33 percent (20 of 61) of the respondents supported the preferred alternative, Alternative D; 90 percent (18 of 20) of those favoring Alternative D reside in the economic impact area. Nearly 30 percent (18 of 61) of the respondents did not specify a preference, and 5 percent (1 of 18) reside in the economic impact area. Fifteen percent (9 of 61) of the respondents preferred Alternative A, the No Action, No Change Alternative; none of these respondents reside in the economic impact area.

7.1.2 Respondent Affiliations

Table 7.2 lists five types of respondent affiliation: individual, organization, business, state government, and federal government. Seventy-five percent (46 of 61) of the respondents submitted comments as individuals; 39 percent (18 of 46) of the individual respondents preferred Alternative D, and 24 percent (11 of 46) did not specify a preference. Thirteen percent (8 of 61) of the respondents represented an organization, with 50 percent (4 of 8) favoring Alternative A and 38 percent (3 of 8) not specifying a preference. Six percent (4 of 61) of the respondents were affiliated with state government; 25 percent (1 of 4) favored Alternative A and 75 percent (3 of 4) did not specify a preference. Three percent (2 of 61) of the respondents were affiliated with the federal government, with 50 percent (1 of 2) favoring Alternative D and 50 percent (1 of 2) unspecified. Only one business responded and expressed a preference for Alternative D.

7.1.3 Suggested Modifications

Some of the respondents suggested modifications to the alternatives. Their numbers are not accounted for in the percentages above, but are represented on Tables 7.1 and 7.2. The following paragraphs present the suggested alternative modifications, and one lists suggestions made by respondents who did not specify a preference.

Table 7.1 Distribution of Preference for Development Alternative by Respondent's Location of Residence

Location	Alternative										
	A	A (mod)	B	B (mod)	B or C	C	B,C, or D	D	D (mod)	E	Total
Bluff City, AR			1								1
Booneville, AR								1			1
Conway, AR					1						1
Dardanelle, AR								1			4
Fayetteville, AR						1				1	2
Ft. Smith, AR	3			1						3	7
Little Rock, AR	5	1	1			1		1	3	6	18
Palestine, AR									1		1
Paris, AR	1			1				16		1	19
Pine Bluff, AR										1	1
Roland, AR										1	1
Russellville, AR										4	4
Baton Rouge, LA						1	1				2
Vicksburg, MS								1			1
Dallas, TX										1	1
Totals	9	1	2	2	1	3	1	20	4	0	61

One comment was coded as A (mod). This respondent suggested a non-development alternative with increased resource protection.

Two comments were coded as B (mod). One suggested rebuilding lodge and cabins "just like it was before". The other suggested a state park development limited to a visitor center, existing facilities, and a wilderness area on top of the Mountain.

Four comments were coded as D(mod). Three indicated support of constructing the minimum number of facilities proposed, locating the lodge at the alternative site, and deleting the 19th century homestead; and one suggested deleting the lodge and providing more cabins and/or campsites.

Of the 18 comments coded as Unspecified, 7 indicated support or acceptance of some level of state park development on the Mountain:

- 1 suggested appropriate design for proposed lodge;
- 1 supported state park development in general;
- 1 supported construction of modern facilities, eg. lodge and employee facilities;
- 1 supported U.S. Fish & Wildlife Service Comments on Alternative D (U.S. Fish and Wildlife Service commented favorably on Alternative D);
- 1 was not opposed to state park development;
- 1 supported a park with no lodge; and
- 1 supported rebuilding lodge and cabins exactly to original number and design.

7.2 Oral Comments

7.2.1 Little Rock Meeting

Seven people made formal statements at the 22 September 1992 public meeting in Little Rock, AR. Table 7.3 presents the development preferences of these respondents.

Of the comments coded as Unspecified, one supported state park development, but did not indicate a preference for a particular development alternative.

Of the comments in support of Alternative D, one expressed a preference for building the lodge at the original lodge site and building the 19th century homestead at the alternative lodge site.

7.2.2 Paris Meeting

Sixteen people presented oral comments at the 29 September 1992 public meeting in Paris, AR. A representative of the U.S. Fish and Wildlife Service read a prepared written statement, which is summarized as part of the written comments in Section 7.1. Table 7.4 presents the preferences of the remaining 15 respondents at the Paris meeting.

Of the 7 comments which indicated no specific preference for a development alternative, 4 were in favor of some degree of development:

- 1 was in favor of a less developed alternative than Alternative D, which would include a small lodge at the alternative lodge site;
- 1 was in favor of general facility development;
- 1 was in favor of maintaining free camping; and
- 1 was in favor of state park development.

Of those comments in support of Alternative D:

- 1 expressed preference for cabins with kitchens; and
- 1 expressed preference for constructing the lodge at old lodge site.

Table 7.3 Preferences Expressed at the Little Rock Meeting for Development Alternative

Alternative A	1
Alternative D	3
Alternative D (mod)	1
Unspecified	2
Total	7

Table 7.4 Preference Expressed at the Paris Meeting

Alternative D	8
Unspecified	7
Total	15

8.0 REFERENCES

- Advisory Council on Historic Preservation. 1988a. Policy Statement Regarding Treatment of Human Remains and Grave Goods. Adopted by the Advisory Council on Historic Preservation, September 27, 1988, Gallup, New Mexico.
- Advisory Council on Historic Preservation. 1988b. Policy Interpretation Memorandum 89-1. Treatment of Human Remains and Grave Goods. December 1, 1988. Washington, D.C.
- Allen, R.T. 1988. Letter to Lynn Neff, Ozark National Forest, dated 22 September 1988.
- Allen, R.T. 1989. A survey of the arthropods of the east and south slopes and plateau of Magazine Mountain. A report submitted to the Arkansas Nature Conservancy, October, 1989.
- Allen, R.T. 1990. Insect endemism in the Interior Highlands of North America. *Florida Entomologist*. 73(4):539-567.
- Allen, R.T. 1991a. Magazine Mountain Biological Inventory Newsletter. 1(1-2). August, October-November, 1991.
- Allen, R.T. 1991b. Magazine Mountain Biological Inventory Newsletter. 1(1):1-16. Delaware Agricultural Experiment Station, Department of Entomology and Applied Ecology, Newark.
- Allen, R.T. 1991c. The Biota of Magazine Mountain (I): An outline of the natural history of Magazine Mountain. *Proceedings of Arkansas Academy of Science*. 45:13-17.
- Allen, R.T. 1992. Personal Communication. Chairman, Department of Entomology and Applied Ecology, University of Delaware.
- Allen, R.T. In press. *Pedetontus gershneri*, a new species of Michilidae (Insecta: Microcorphia) from the Interior Highlands. *Transactions of the American Microscopy Society*.
- Allen, R.T. and R.L. Brown. 1991. The biota of Magazine Mountain (II): A preliminary list of the macrolepidoptera fauna. In: *Proceedings of Arkansas Academy of Science*. 45:18-21.
- Allen, R.T. and C.E. Carlton. 1987. Status of two endemic beetles on Magazine Mountain. Report submitted to Arkansas Natural Heritage Commission.
- Allen, R.T. and C.E. Carlton. 1988. Two new *Scaphinotus* from Arkansas with notes on other Arkansas Species (Colcopetra: Carabidae: Cychrini). *Journal New York Entomological Society*. 96(2): 129-139.
- Allen, R.T., C.E. Carlton, and S.A. Tedder. 1988. A new species of *Acalypta* (Hemiptera, Tingidae) from Arkansas. *Journal of the Kansas Entomological Society*. 61(1):126-130.

- Anonymous. 1941. Work Project Report, Supplement to Form 11, Camp F-31, September 3, 1941. Microfilm US CCC, reel 2. Mullins Library, University of Arkansas, Fayetteville.
- Arkansas Department of Labor. 1991. Arkansas Labor Force Statistics for 1980-1990.
- Arkansas Department of Parks and Tourism. 1988. Prospectus Mt. Magazine State Park.
- Arkansas Department of Parks and Tourism. 1989. Mt. Magazine Fact Sheet. Unpublished information developed by the Division of Parks for 1989 Mt. Magazine EIS public listening sessions, Little Rock.
- Arkansas Natural Heritage Commission. 1990. Elements of special concern for Magazine Mountain, Arkansas. October 24 1990. Printout from Natural Heritage Inventory Program Database.
- Arkansas Natural Heritage Commission. 1991. Elements of special concern: elements specifically located on Magazine Mountain; Elements specifically located on Magazine Mountain by area; and Elements generally located on Magazine Mountain. December 11, 1991. Printout from Natural Heritage Inventory Program Database.
- Baerg, W.J. 1927. Summer birds on Mount Magazine, Logan County, Arkansas. The Ark. XLIV(4).
- Barr, T.C. 1974. The eyeless beetles of the genus *Arianops* Brendel (Coleoptera: Pselaphidae). Bulletin of the American Museum of Natural History. 145(1):1-51.
- Bailey, R.W. and U.T. Rinnell. 1968. History and management of the wild turkey in West Virginia. West Virginia Department of Natural Resource Division Game Fish Bulletin. 6:59.
- Beckmann, D.G. 1989. Industrial linkages, tourism, and the Arkansas economy. Arkansas Business and Economic Review. 22(4):21-32.
- Buckholz, J.T. and E.J. Palmer. 1926. Supplement to the catalogue of Arkansas Plants. Trans. Acad. Sci. of St. Louis. 25:91-155. (Tucker 1972).
- Burgraff, F. and K. Rollett. 1989. Design harmony of man-made elements in natural setting as exemplified by the architectural resources and facilities of certain Arkansas State Parks. A State Parks report financed by tax funds of the State of Arkansas. On deposit in Special Collections, Mullins Library, University of Arkansas, Fayetteville.
- Caldwell, R.S. 1986. Status of *Mesodon magazinensis* (Pilsbry and Ferris), the Magazine Mountain middle-toothed snail. Report submitted to Arkansas Nongame Species Preservation Program. April 1986.

Carlson, Barbara. 1992. Personal Communication. University California, Riverside.

Carlton, C.E. and R.T. Allen. 1989. A new species of *Arianops* Brendel and the male of *Arianops sandersoni* Barr (Coleoptera, Pselaphidae). *Coleopterists Bulletin*. 43(1):59-67.

Clark, M. 1962. *Trichomanes boscianum* in Madison County, Arkansas. *American Fern Journal*. 52:85-86.

Clark, J. 1991. Personal Communication. Assistant Chief, Wildlife Management Division, Arkansas Game and Fish Commission.

Corbitt, R.A. 1990. *Standard Handbook of Environmental Engineering*. McGraw-Hill, New York.

CPS. 1973. *Economic Feasibility of Mt. Magazine Recreation Site*. For the U.S. Forest Service.

Davis, H.A., ed. 1982. *A State Plan for the Conservation of Archeological Resources in Arkansas*. Arkansas Archeological Survey Research Series No. 21, Fayetteville.

Davis, J.R. 1976. *Management for Alabama wild turkeys*. Alabama Department of Conservation Spec. Rept. 5:130.

Demaree, D. 1933. A catalogue of the ligneous flora of Arkansas. *Hendrix - Galloway Bull.* XIX(2), No. 2. (Tucker 1972).

Dobkin, D. 1983. Rufous-crowned sparrow *Aimophila ruficeps*: B487 of Natural Heritage Division, California Department of Fish and Game. 2p.

Earth Info Climate Database. 1990. NOAA National Climatic Data Center data for Mt. Magazine, AR (8/1948 - 11/1966); Booneville, AR (1/1948 - 3/1977); Paris, AR (9/1949 - 7/1972); and Subiaco, AR (1/1948 - 12/1989).

Endangered Species Act. 1973. Public Law 93-205 as amended.

Fort Smith Times Record. 1944. Mt. Magazine Cottages Open Again This Year. Sunday, June 4, 1944. Microfilm, Mullins Library, University of Arkansas, Fayetteville.

Foti, T. 1992. Personal Communication. Arkansas Natural Heritage Commission.

Friedmann, T.R. 1971. Further information on the host relationships of parasitic cowbirds. *The Ark.* 88:239-255.

- Fritschie, E. 1979. Letter from E. Fritschie, United States Hang Gliders Association Observer Region VI, to Ozark-St. Francis National Forest Service. Received January 17, 1979.
- Graham, W.W., Inc. 1981. Preliminary Engineering Report for Mt. Magazine Water System. Unpublished Report Prepared for Ozark-St. Francis National Forests.
- Green, G. 1980. Mt. Magazine, A History. A report published by Garvin Green. On deposit at Mullins Library, University of Arkansas, Fayetteville. 30 pp.
- Green, G. 1988. Mt. Magazine: Supplement to Mt. Magazine, A History. A report published by Garvin Green.
- Grinnel, J. and A.H. Miller. 1944. Distribution of birds of California Pacific Coast. The Ark. 27.
- Hartfield, P. 1989. Technical Draft. Magazine Mountain Shagreen, *Mesodon magazinensis*. Recovery Plan. U.S. Fish and Wildlife Service. Jackson, Mississippi.
- Hess, W.J. 1989. Letter from W.J. Hess, Botanist, Morta Arboretum, to Gary Tucker, Forest Botanist, Ozark-St. Francis National Forest, dated August 15, 1989.
- Hess, W.J. and N. Stoyhoff. 1990. The Natural history of *Quercus shumardii* Buckley var. *acerifolia* Palmer (= *Quercus acerifolia* Stoyhoff and Hess *stat. nov.*). 38 pp.
- Holsinger, J.R. 1967. Systematics, speciation, and distribution of the subterranean amphipod genus *Stygonectes* (Gammaridae). Bulletin of the United States National Museum. 259:176.
- Holsinger, J.R. 1991. Letter from J.R. Holsinger, Professor, Old Dominion University, to Paul Hartfield, U.S. Fish and Wildlife Service, dated April 11, 1991.
- Hubricht, L. 1972. The land snails of Arkansas. Sterkiana. 42:15-16.
- Hubricht, L. 1985. The distribution of native land snails of the eastern United States. Fieldiana, Zoology, New Series No. 24. Field Museum 4 National History, Chicago.
- Hubricht, L. and J.G. Mackin. 1949. The freshwater isopods of the genus *Lirceus* (Asellota, Asellidae). American Midland Naturalist. 42(2):334-394.
- James, D. A. and J.C. Neal. 1986. Arkansas Birds, Their Distribution and Abundance. The University of Arkansas Press. 402pp.
- Johnson, G. 1992. Personal Communication. Assistant Professor of Biology, Arkansas Tech University, Arkansas.

Lookingbill, S.M., M. Cleveland, and M.J. Guccione. 1987. Botanical evidence for Holocene movement of rock streams in Arkansas. In Proceedings of the Arkansas Academy of Sciences, V. Peck. ed. 41(4):63-72.

Mackin, J.G. and L. Hubricht. 1938. Records of distribution of species of isopods in central and southern United States, with descriptions of four new species of *Mancasellus* and *Asellus* (Asellota, Asellidae). American Midland Naturalist. 19:628-637.

Marchinton, R.L. and D.H. Mirth. 1984. Behavior. In: J.C. Halls White-tailed Deer: Ecology and Management Stackpole Books. Harrisburg. 129-169pp.

Martin, A.C., H. Zim and A.L. Nelson. 1951. American Wildlife and Plants: A guide to wildlife food habits. Dover Publications, NY NY. 500p.

Mathis, M.L. and D.E. Bowles. 1989. A new microcaddisfly genus (Trichoptera: Hychoptilidae) from the Interior Highlands of Arkansas, USA. In: Journal of the New York Entomological Society. 97(2):187-191.

McBride, R. 1991. Arkansas Mountain Lion Survey. 1988-1991.

Moore, D.M. 1941. Some noteworthy fern communities of Arkansas. American Fern J. 31:63-71.

Neller, E. 1979. An Archeological Reconnaissance of Magazine Mountain, Arkansas. United States Forest Service, Ozark National Forest, Russellville.

Norquist, C. 1992. Personal Communication. Endangered Species Specialist, U.S. Fish and Wildlife Services.

Odegard, R. 1991. Personal Communication. Wildlife Biologist, USDA Forest Service. Ozark National Forest.

Odegard, R. 1992. Personal Communication. Wildlife Biologist, USDA Forest Service. Ozark National Forest.

Opler, P.A. and G.O. Krizek. 1984. Butterflies East of the Great Plains. John Hopkins University Press, Baltimore. 294p.

Palmer, E.J. 1927. On Nuttall's trail through Arkansas. J. Arnold Arboretum. 8:24-55.

Parker, M. 1991. Personal communication. State Curator, Arkansas Audubon Society.

Parker, M. 1992. Personal communication. State Curator, Arkansas Audubon Society.

- Peck, J.H. 1986. *Dryopteris carthusiana* at Mt. Magazine, Logan County, Arkansas. *Proceedings of the Arkansas Academy of Science*. 40:94.
- Peck, J.H. and C. Peck. 1987. Status report on the fern *Woodsia scopulina* in Arkansas. *Proc. Arkansas Acad. Sci.* 41:112.
- Pemberton, J.R. 1910. Notes on the rufous-crowned sparrow. *Condor*. 12:123-125.
- Pilsbry, H.A. and J.H. Ferris. 1906. Mollusca of the Ozarkian fauna. *Academy of Natural Science. Philadelphia*. 29:259-167.
- Pyle, H. 1939. The herbaceous flora of Magazine Mountain. Master's Thesis. University of Arkansas, Fayetteville. 38pp.
- Roberg, R. 1992. Personal Communication. Endangered Species Coordinator, Arkansas Game and Fish Commission.
- Robotham, C.D. and R.T. Allen. 1988. *Paraleptophlebia calcarica*, n. sp. (Ephemeroptera: Leptophlebia) from western Arkansas. *Journal of the Kansas Entomological Society*. 61(3):317-320.
- Rogers, C.E. 1979. Moments of Mt. Magazine. A report privately published by Catherine Eikleberry Rogers. 94pp.
- Sealand, T. and G.A. Heidt. 1990. Arkansas Mammals; Their Natural History, Classification and Distribution. University of Arkansas Press. 30pp.
- Shepherd, W.M. 1972. Rufous-crowned sparrows in Arkansas. *Arkansas Audubon Society Quarterly Newsletter*. XVII(2).
- Shepherd, W.M. 1991. Personal communication. Biologist, Arkansas Natural Heritage Commission.
- Short, H.L. 1986. Habitat Suitability Index Models: White-tailed deer in the Gulf of Mexico and South Atlantic Plains. Biological Report 82(10.12). USFWS. National Ecology Center, Washington, D.C.
- Smith, E.B. 1988. An atlas and annotated list of the vascular plants of Arkansas. Kinko's Copies, Fayetteville, AR. 489pp.
- Spears, C. 1992. A cultural resources assessment and archaeological survey of selected areas of the proposed state park on Mt. Magazine, Logan County, Arkansas. Spears Project Report No. 49.

Steiermark, J.A. 1963. Flora of Missouri. Iowa State University Press, Ames. 1728pp.

Taylor, W.C. 1984. Arkansas Ferns and Fern Allies. Milwaukee Public Museum, Milwaukee, Wisconsin. (Tucker 1990a).

Tucker, G. 1972. The vascular plants of Magazine Mountain. Contract report submitted to Ozark National Forest. 68pp.

Tucker, G. 1976. Endangered and threatened plants of the Ozark-St. Francis National Forests. Contract report submitted to Ozark-St. Francis National Forest. 33pp.

Tucker, G. 1980. Inventory of Threatened and Endangered Plant Species, Final Report. Unpublished report prepared for the Ozark-St. Francis National Forests. Contract No. 53-432P-8-00258. 208pp.

Tucker, G. 1988. Letter to Mr. L. Neff, Ozark-St. Francis National Forests Supervisor. September 26, 1988. 7pp.

Tucker, G. 1990a. A survey of the botanical features of Magazine Mountain on the slopes and plateau surface. Contract report submitted to Arkansas Nature Conservancy. 55pp.

Tucker, G. 1990b. Personal Communication. December 7, 1990.

Tucker, G. 1992. Personal Communication.

USDA Soil Conservation Service and Forest Service in cooperation with Arkansas Agricultural Experiment Station. 1980. Soil Survey of Logan County, Arkansas.

United States Department of Commerce, Bureau of Census. 1960. Census of Population, General Social and Economic Characteristics.

Ibid. 1970.

Ibid. 1980.

Ibid. 1990.

United States Department of Commerce, Bureau of Economic Analysis. 1984-1989. Regional Economic Information System.

United States Environmental Protection Agency. 1983. Results of Nationwide Urban Runoff Program. II(F). December 1, 1983.

United States Fish and Wildlife Service. 1989. Letter and attachment from L. Barclay, Field Supervisor USFWS, to R. Davies, Director, Arkansas State Parks, indicating Endangered and candidate species known to occur on or in the vicinity of Magazine Mountain, December 18, 1989. 3pp.

United States Fish and Wildlife Service. 1990. Letter to Mr. C.D. Daniel, USDA Forest Service, Ozark-St. Francis National Forests from Ms. M.A. Harney, Acting Field Supervisor. December 21, 1990, Vicksburg.

USDA Forest Service. 1968. Soils report for recreation planning, Mt. Magazine Recreation Area.

USDA Forest Service. 1979. Mt. Magazine Recreational Development Level Final Environmental Impact Statement. 62pp.

USDA Forest Service. 1985. Environmental Policy and Procedures Handbook. Chapters 10 through 60, amendment 2.

USDA Forest Service. 1988a. Mt. Magazine Information Packet. Unpublished information developed by the Ozark-St. Francis National Forests, Supervisor's Office, Russellville.

USDA Forest Service. 1988b. Land and Resource Management Planning Handbook, Chapter 4, Forest Planning Documents.

USDA Forest Service, Ozark-St. Francis and Ouachita National Forests. 1989a. Action Plan Implementing the Treatment of Human Remains Policy on the Ozark-St. Francis and Ouachita National Forests, Arkansas. On file with the United States Forest Service, Russellville.

USDA Forest Service, Southern and Eastern Regions. 1989b. Treatment of Human Remains Policy. On file with the United States Forest Service, Russellville.

USDA Forest Service. 1989c. Memorandum from G. Tucker, Forest Botanist, to R. Kopack, Magazine Ranger District, on the proposed State Park on Magazine Mountain. December 27, 1989.

USDA Forest Service. 1989d. Special plants of the Ozark-St. Francis National Forests.

USDA Forest Service. 1989e. Forest Service Handbook, Environmental Policy and Procedures, Title 1900.

USDA Forest Service. 1989f. Forest Service Manual Title 2600, Wildlife, Fish and Sensitive Plant Habitat Management.

USDA Forest Service. 1989g. Land and Resources Management Plan as amended. Ozark-St. Francis National Forests.

USDA Forest Service. 1990a. Draft Interim Management Guide for Ozark Chinquapin.

USDA Forest Service. 1990b. Draft Interim Management Guide for Small-Headed Pipewort.

USDA Forest Service, Southern Region. 1990c. Final Environmental Impact Statement for Management in the Ozark-Ouachita Mountains. USDA Forest Service Forest Service, Southern Region.

USDA Forest Service. 1989. Region 8 Sensitive Species List. FSR8 Supplement 2670.44 Exhibit 01, Part 1 and Part 3. (effective 7/18/91).

USDA Forest Service. 1992. Compartment file records. Mt. Magazine, Ozark-St. Francis National Forests.

USDA Forest Service. 1993. Biological Assessment and Evaluation for Action Alternatives of the Proposed Mt. Magazine State Park. Ozark St. Francis National Forests, signed by R. Odegard, 3 February 1993.

Vere, V.K., A. Duke and S. Hutchinson. 1982. A preliminary report on the development of the rock streams and adjacent cliffs on Mt. Magazine, Arkansas. Abstract, 66th Annual Meeting of Arkansas Academy of Science.

Vere, V.K. 1983. A preliminary report on the rock streams of Mount Magazine, Arkansas. Report to U.S. Forest Service, Ozark National Forest, Russellville. 16pp.

Vere, V.K. 1989. Letter to Bill Paxton, Arkansas State Parks. December 23, 1989.

Vere, V.K. 1991. Personal Communication. Professor, Department of Geology, Arkansas Tech University, Russellville.

Verner, J. and A.S. Boss. 1980. California wildlife and habitat of the western Sierra Nevada - General Technical Report No. PSW-37. USDA Forest Service Forest Service.

Wright, G.A. and P.W. Speake. 1975. Compatibility of the eastern wild turkey with recreational activities at Land Between the Lakes, Kentucky Proc. Southeastern Association Game and Fish Commissioners. 29:578-584.

9.0 INDEX

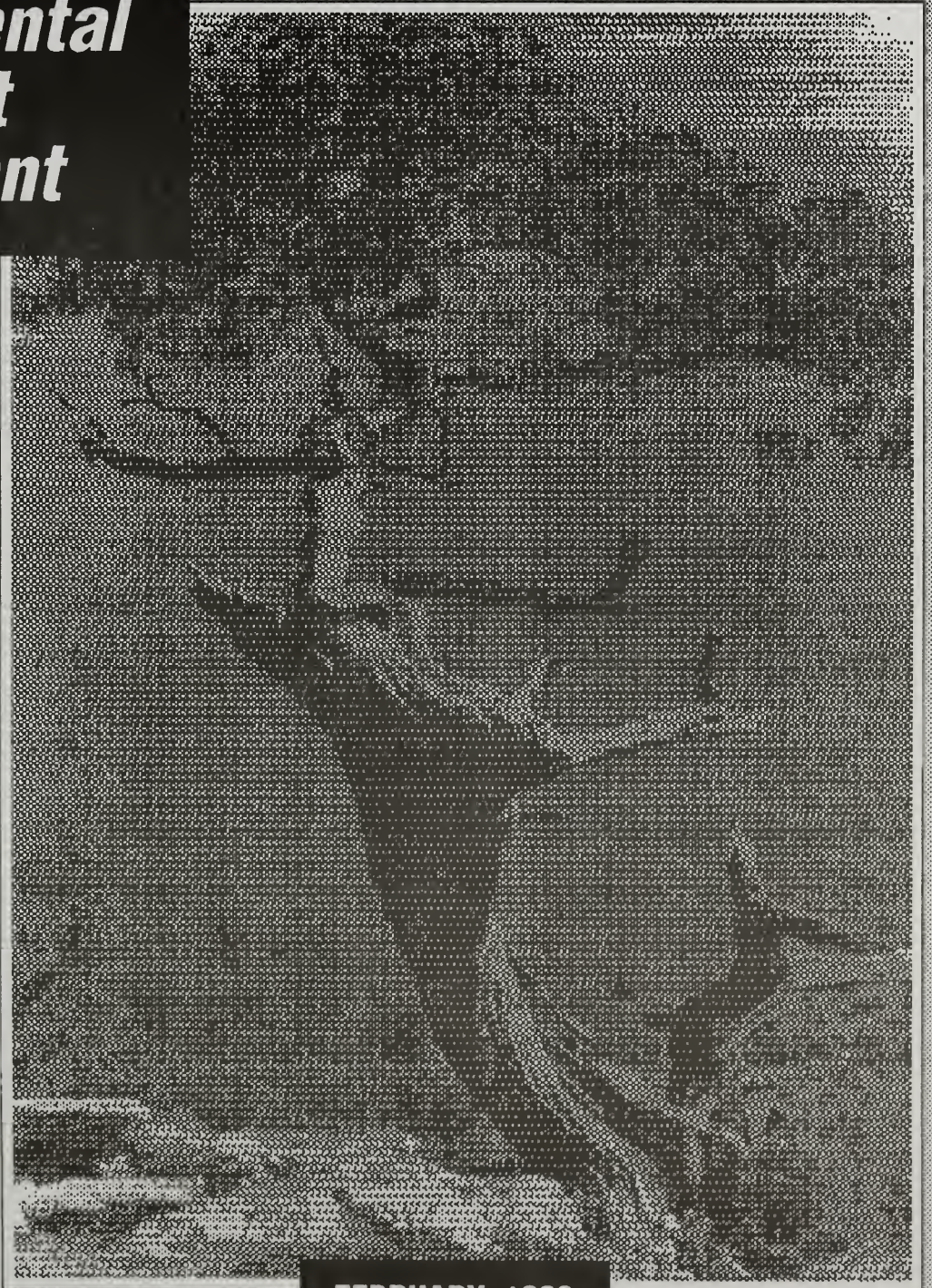
Aesthetics . . .	2-25 to 2-26; 2-32; 3-54 to 3-55; 4-8; 4-24 to 4-25; 4-28; 4-30; 4-45 4-48; 4-53
Air	6; 2-21; 2-27; 4-2; 4-11 to 4-12, 4-25; 4-32
Alternative A	1; 2-6 to 2-11; 4-1; 4-2 to 4-8
Alternative B	2; 2-7 to 2-9; 2-11 to 2-13; 4-1; 4-8 to 4-25
Alternative C	3; 2-7 to 2-9; 2-13 to 2-15; 4-1; 4-25 to 4-30
Alternative D	4; 2-7 to 2-9; 2-15 to 2-17; 4-1; 4-30 to 4-45
Alternative E	4; 2-7 to 2-9; 2-18 to 2-20; 4-1; 4-45 to 4-53
Construction Effects	2-21; 2-22; 4-12 to 4-14; 4-33 to 4-36
Cultural Resources	1-6; 2-1; 2-23; 2-30 to 2-31; 3-30; 4-7; 4-16; 4-19 to 4-22 4-27; 4-41 to 4-42; 4-50
Environmental Consequences	6; 4-1 to 4-56; 2-20 to 2-32
Geology	3-1 to 3-2; A-4 to A-6
Invertebrates	2-23; 2-29; 2-30; 3-25 to 3-29; 4-5; 4-6 to 4-7; 4-17; 4-19; 4-27 4-38; 4-40 to 4-41; 4-49; D-1 to D-4
List of Commentors	G-2 to G-5
Operation & Maintenance Effects	2-21; 4-14 to 4-15; 4-16 to 4-17; 4-26
Oral Comments	7-4 to 7-5; G-114 to G-125
PETS 1 to 5; 1-6; 2-1; 2-4; 2-23; 2-29 to 2-30; 3-14 to 3-29; 4-5 to 4-7; 4-17 to 4-19 4-27; 4-38 to 4-41; 4-49 to 4-50; A-15; B-1	
Plants	2-22; 2-29 to 2-30; 3-14 to 3-21; 4-5 to 4-6; 4-17 to 4-18; 4-27 4-38 to 4-40; 4-49; A-1 to A-17; B-1 to B-31
Public Participation	1-4; 2-4; 7-1 to 7-5
Public Use, Opportunities for	1-7; 2-1; 2-25; 2-31 to 2-32; 3-54; 4-3 to 4-5 4-7 to 4-8; 4-22 to 4-24; 4-28; 4-36 to 4-38; 4-42 to 4-45; 4-50; 4-52 to 4-53
Socioeconomics	1-7; 2-1; 2-24 to 2-25; 2-31; 3-33; 3-40 to 3-53; 4-7; 4-28 4-29; 4-42; 4-43; 4-50; 4-51; E-1 to E-36
Soil	2-20; 3-3; 4-2; 4-8 to 4-10; 4-25; 4-30 to 4-31; 4-46
Summary of Comments	G-1
Vegetation	2-22; 2-27 to 2-28; 3-5 to 3-10; 4-2 to 4-5; 4-12 to 4-15; 4-26 4-33 to 4-38; 4-48; A-1 to A-17; B-1 to B-31

INDEX (CONT'D)

Vertebrates . . .	2-22; 2-23; 2-28 to 2-29; 2-30; 3-21 to 3-25; 4-5; 4-6; 4-16 to 4-17 4-18 to 4-19; 4-26; 4-27; 4-38; 4-40; 4-49; C-1 to C-10
Water	6; 2-20; 2-21; 2-27; 3-3 to 3-4; 4-2; 4-10 to 4-11; 4-13 to 4-14 4-16; 4-21; 4-25; 4-31 to 4-32; 4-34 to 4-35; 4-46 to 4-48
Wetlands	3-10; 4-5; 4-15 to 4-16; 4-26; 4-38; 4-48
Wildlife . . .	2-22; 2-28 to 2-29; 2-30; 3-10 to 3-14; 3-21 to 3-29; 4-5; 4-6 to 4-7; 4-16 to 4-17; 4-18 to 4-19; 4-26 to 4-27; 4-38; 4-40 to 4-41; 4-49 to 4-50; C-1 to C-10
Written Comments	7-1 to 7-4; G-6 to G-112

MOUNT MAGAZINE STATE PARK

FINAL Environmental Impact Statement



FEBRUARY, 1993

THE
SUNSHINE
SOCIETY

1984
SUNSHINE
SOCIETY
MEMBERSHIP

APPENDIX A:

Excerpts from
"A Survey of the Botanical Features of Magazine Mountain
on the Slopes and Plateau Surface"
Gary E. Tucker, January 1990a

A SURVEY OF THE BOTANICAL FEATURES OF MAGAZINE MOUNTAIN
ON THE
SLOPES AND PLATEAU SURFACE

by

Gary E. Tucker

January 1989

Introduction

Magazine Mountain, a large mountain with affinities to the Ouachita Mountains but disjunct from them and located in the Arkansas River Valley in Logan and Yell counties, is the highest elevation point in Arkansas. It has long been noted for its unique flora and fauna, some taxa of which are endemic to the mountain. Numerous studies (Palmer, 1927; Pyle, 1939; Moore, 1941; Tucker, 1972, 1976, 1980; and others) have shown significant botanical features on Magazine Mountain.

This two-year study was directed toward gaining information on (1) current status of 25 plant taxa of special concern on all parts of the mountain, (2) major plant communities on the mountain and their distribution, and (3) examination of the slope vegetation, especially on the south and east slopes. The study was done primarily to generate information for use in determining whether or not the slopes of Magazine Mountain merit possible designation as a Research Natural Area (RNA) by the U.S. Forest Service. The work was supported through a cooperative effort between the Ozark-St. Francis National Forests, The Nature Conservancy, and Arkansas Natural Heritage Commission.

History of Study Area

The history of the study area, unfortunately, is not well documented from the perspective of a botanical study. Although earlier explorers may have visited the area the earliest publication seen making mention of Magazine Mountain was Nuttall (1821). Nuttall's observations primarily related to the mountain's physical appearance, and there is no evidence that he actually set foot on the mountain. Probably he saw the mountain only from a distance, which would be a logical reason for a lack of any mention of its botanical features. His drawing of the mountain is the oldest known illustration. Search of other

early literature, including the numerous papers of F. L. Harvey, botany faculty member at Arkansas Industrial University (now University of Arkansas) in the period of 1875-1885, did not reveal any mention of Magazine Mountain. E. J. Palmer (1927), long associated with Arnold Arboretum at Harvard University, apparently was the earliest botanist to describe the significant botanical features of Magazine Mountain. By the time Palmer visited the mountain in 1924 for the first of many times, though, it already had experienced settlement with considerable its associated landclearing and other disturbance factors. Moreover, the west end of Magazine Mountain had been platted for a townsite and had experienced a tourist "boom" by the time of Palmer's first visit (Rogers, 1979; Green, 1980).

The University of Arkansas initiated its long-standing interest in Magazine Mountain in the early 1920's, first with the work of John Buchholz and later Delzie Demaree and Dwight Moore, all botany faculty members who were working in the early 1920's. Buchholz left the state in the early 1920's but Moore's plant collections on the mountain extended well into the 1960's and Demaree's continued to about 1980. Buchholz and Palmer (1926) collaborated in the publication of a major supplement to the list of Arkansas plants, and perusal of the paper indicates both individuals made significant collections on Magazine Mountain. In a later paper Palmer (1927) gave a detailed overview of the vegetation of Magazine Mountain and mentioned its dominant species as well as many of its rarities. His account of the discovery and new description of the Maple-leaved oak appeared at the end of the paper. Hoyt Pyle (1939) was one of D. M. Moore's graduate students at the University of Arkansas and completed a floristic survey of the plants on the top of the mountain as a Masters thesis. Tucker (1972) attempted to re-collect as many of the entries on the Pyle list as possible and to correlate the plant names on Pyle's list with current nomenclatural usage. Moore (1941) summarized the ferns and fern allies of the mountain. Taylor (1984) did considerable field work on Magazine Mountain in conjunction with the production of his detailed study of Arkansas ferns. Peck (1986) and Peck and Peck (1987) published accounts of population analyses of several of the significant fern species on the mountain.

Two local histories published by area residents, Catherine Eikleberry Rogers (1979) and Garvin Green (1980) outlined significant historical events relative to Magazine Mountain. These two works are valuable sources of information for possible use in correlating present vegetation features with past disturbance factors.

Descriptive Account of Study Area

General Description

The noted American botanist E. J. Palmer (1927) was one of the first to give definitive coverage to the natural features of Magazine Mountain. Palmer was recognized as a professional botanist of top-notch quality and probably was equally as knowledgeable in the field of geology, no mean feat in view of the fact he had not formal education beyond the public schools. His almost poetic description of the mountain follows:

"Magazine Mountain, situated about fifteen miles south of the Arkansas River, is the highest and largest of the mountains of southern Arkansas, and indeed it is easily the most striking feature of the mid-continent elevation. Both on account of its magnitude and its comparative isolation from other peaks, its clear-cut outline is, under favorable atmospheric conditions, an impressive and familiar landmark for many miles in all the directions. Viewed in outline against the sky-line from either the north or south side, the homely name given it by the early French hunters, from its supposed resemblance to a barn, seems not inappropriate, however much we might wish that it had received a more dignified or poetic designation. As seen from the south, the direction from which it is now most easily approached and from which most of my ascents were made, the platform or plateau that forms its summit appears as a long line inclined very slightly towards the plain. On the west side there is an extension or lower platform of about two thirds the height of the main elevation. On nearer approach it is seen that the slopes are heavily wooded and dissected along the lower levels by many ravines and chasms. A bold facade of nearly naked cliffs stands out along the margin of the plateau, the summit of which is occupied by a smaller growth of timber."

The boat-shaped silhouette of Magazine Mountain, about seven miles in length, certainly is one of the most impressive local topographic features of the Arkansas River Valley region. Croneis (1930) and later authors have provided structural evidence that the geologic features of the Arkansas River Valley relate more closely to the Ouachita province than to the Ozark province, the basis for the usual assignment of Magazine Mountain to the Ouachita Mountain province, as in Arkansas Department of Planning (1974).

The Arkansas River Valley region generally is a gently rolling plain, the surface of which is interrupted by numerous elongate ridges and a few broad-topped synclinal hills and mountains. The most prominent of these large, mesa-like mountains include Sugarloaf, Poteau, Whiteoak, Little Short, Short, Magazine, Nebo, and Petit Jean. Magazine Mountain is the largest and highest of all.

Elevation

The highest point in Arkansas is located on Magazine Mountain. The current USGS topographic quadrangle covering the highest part of the mountain (Blue Mountain, 1966) gives the elevation as 2753 feet. Older literature, including Croneis (1930), gave the elevation as 2823 feet, an erroneous figure still appearing in publications of a popular nature. Prior to the turn of the century the mountain's elevation was considered yet higher at 3275 feet (Green, 1980). The highest point on Magazine Mountain, Signal Hill, is approximately 2400 feet above the Arkansas River, which lies about sixteen miles to the north and which is visible from the mountain on a clear day.

Often one hears a statement to the effect that Magazine Mountain is the highest point between the Rockies and the Appalachians. The statement apparently is accurate if the Black Hills region of South Dakota, where elevations of 7,000 feet occur, are considered a disjunct part of the Rockies.

Climatic Factors

USDA Forest Service, Mt. Magazine EIS (1980) included a succinct summary of climatic factors on the mountain, and that document is the source of all climatological data included in this paper.

"The average annual temperature on the summit of Mt. Magazine is 57 degrees F, 6 degrees cooler than the average of 63 degrees F at its base and the surrounding areas. During January the average summit temperature is 37 degrees F, while that of the base and surrounding areas is about 42 degrees F. The July summit temperature averages 76 degrees F while that of surrounding areas averages 82 degrees F. The midsummer summit temperature is frequently 10-25 degrees cooler than that of the surrounding valleys. Temperatures on the mountain ranged from a high of 103 degrees F to a low of 7 degrees F during the period 1951-1960.

"Precipitation in the area is usually abundant and well distributed throughout the year with an average of 92 days per year having measureable precipitation. The annual precipitation of 55 inches on the summit decreases to about 50 inches at lower elevations. Precipitation ranged from a high of 81 inches to a low of 37 inches during the period 1951-1960.

"The area has high fog on the average of 8.5 days per month. November with 16 foggy days and February with 14 foggy days have the highest occurrences. March and April have the lowest occurrences. Because of the mountainous terrain fog is frequently localized. At times heavy fog covers lower elevations while the summit remains fog free. At other times low clouds shroud the summit."

Data to quantify the incidence of ice and snow on the summit have not been seen. Suffice it to say that ice is a significant feature of the mountain during the winter months, particularly on the summit and upper north slopes.

Geologic Features

Clark (1977) said the Arkansas River Valley "lies between the Ozark and Ouachita Uplifts in Arkansas. Underlying the Arkansas Valley is the Arkoma sedimentary and structural Basin. Magazine Mountain is located over the southern portion of the basin into which Pennsylvanian and upper Mississippian sediments have thickened from the north and continue southward into the Ouachita Geosyncline which existed before the Uplift."

Bedrock exposed on Magazine Mountain is wholly sedimentary in origin and of Middle Pennsylvanian age (Cohoon and Vere, 1988). The stratigraphic sequence exposed on the mountain (Figure 1), from top to bottom, is: Savanna Sandstone Formation, the McAlester Shale Formation, and the Hartshorne Sandstone Formation, all belonging to the Des Moines Series, and the Atoka Formation, belonging to the Atoka Series (Clark, 1977; Cohoon and Vere, 1988).

The Savanna Formation, which forms the cap of Magazine Mountain, is of relatively limited occurrence in Arkansas where it is found on the tops of

GENERALIZED MEASURED SECTION

A-5

SOUTH SLOPE OF MAGAZINE MOUNTAIN
LOGAN COUNTY, ARKANSAS

BY C.B. BARTLETT & R.F. HANSEN.

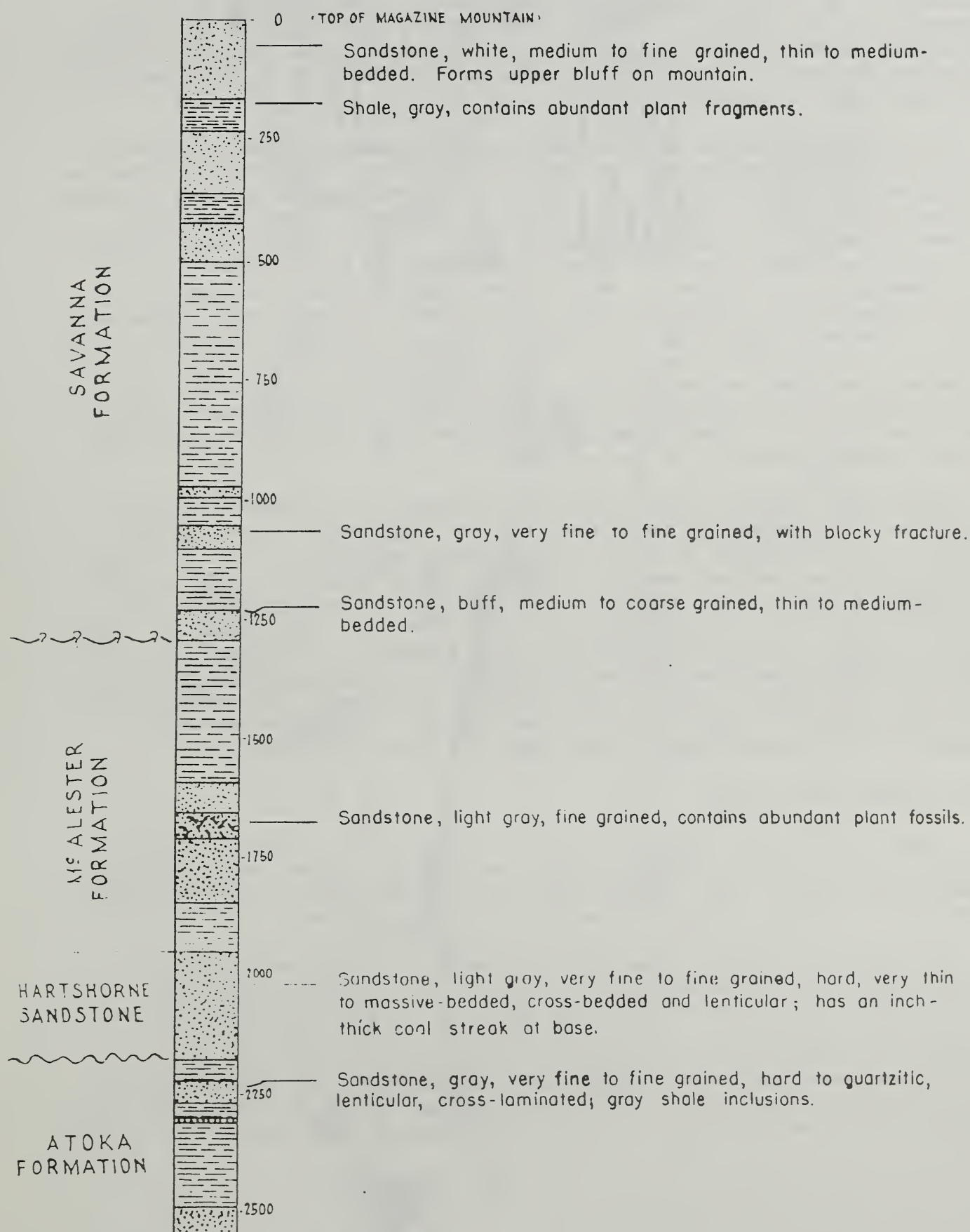


Figure 1. Stratigraphic sequence on Magazine Mountain.
After an unknown original source.

isolated synclinal mountains in Scott, Sebastian, Logan, and Franklin counties (Croneis, 1930). It is the same formation which caps the tops of Short and Little Short mountains, both of which are readily visible to the northwest from atop Magazine Mountain. Clark (1977) wrote, "The Savanna Formation with remnants of the Boggy Formation overlying it are the two youngest Paleozoic formations at the surface in Arkansas and exist only on a few of the higher elevations in the Arkansas Valley." On the current geologic map for the state (Arkansas Geological Survey, 1976) the Boggy is mapped only on Short and Little Short mountains in Arkansas.

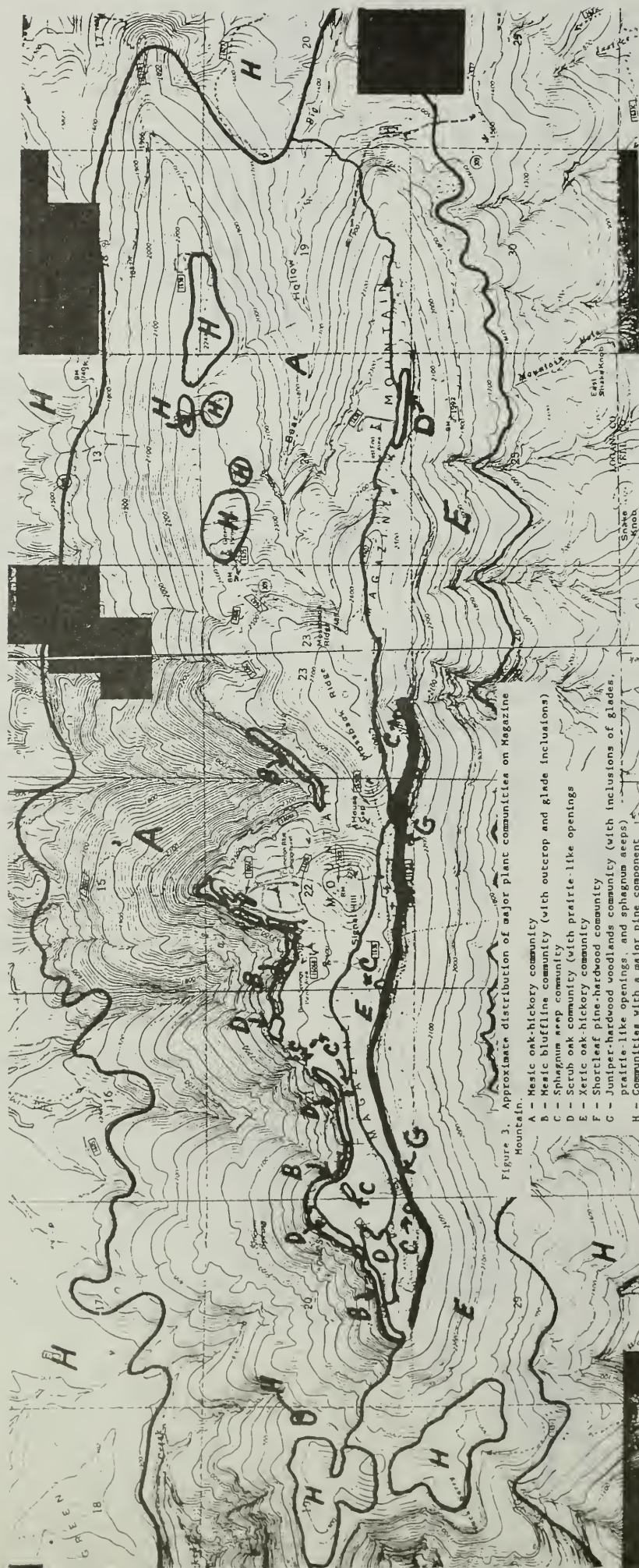
The Savanna Formation is of significance on Magazine Mountain because of (1) its extreme thickness and resistance to weathering, resulting in formation of a prominent bluffline up to 30 meters high surrounding the uppermost slopes of the mountain (Vere, 1982), (2) its role in formation of the large rock streams below the cliffline (Lookingbill et al., 1987), and (3) its inclusion of "siltstone, shale, some thin beds of limestone and coal" (Clark, 1977). Published geologic sections for Magazine Mountain that have been seen do not mention limestone in the upper parts of the column, but very small lenses and layers of material appearing to be impure limestone have been observed in this study on the bluffline along the northern faces of the mountain. Palmer (1927) suggested that there was an obvious calcareous influence at the site. The relationships of the interbedded sandstones, shales, and limestones, consisting both of acidic and calcareous materials, may be significant factors relating to high species diversity on the mountain.

Clark (1977) said a bed of coal with thickness of 2-3 inches, near the contact of the Savanna and the McAlester formations toward the top of the mountain, had been found by Boyd Haley, Arkansas Geological Survey geologist. In this study no coal was seen but rocks with plant fossils, as well as with unassignable carbonaceous material, were found on the north slopes of the mountain, both in the vicinity of the bluffline and at lower elevations. Most of the material seen was of poor quality and fragmentary in nature. Included among the identifiable material was Calamites, Lepidodendron, and Stigmaria, in all cases consisting of large, coarse stems or rootstocks. These observations corroborate Clark's suggestion that "the lower part of the Savanna where exposed on the Mountain may be a good place to search for fossils."

Plant Communities Present

Tucker (1972) gave a generalized descriptive account of major botanical features on the plateau surface of Magazine Mountain without using a formal nomenclature for the plant communities present. The present account utilizes a nomenclature based in large part on dominant plant species.

Any description of the vegetation of Magazine Mountain must take into account both past disturbance factors and present ecological conditions. It is doubtful that anyone can accurately reconstruct the vegetation patterns originally on the mountain. The local histories by Rogers (1979) and Green (1980) both indicated extensive, early landclearing operations on the mountaintop associated with farming, home construction, and various business and recreational enterprises. At the time of the Resettlement Administration's purchase of the mountaintop it is known, for example, that much of its surface



had been cleared and planted to row crops such as corn, cotton, and garden vegetables. Much of the present forest cover, then, probably is of relatively recent origin through old field succession. See Figure 2 for Rogers' map showing areas of past disturbance on the mountain.

Figure 3 shows the approximate distribution of the major plant communities recognized in this study on Magazine Mountain. In some cases the map indicates present distributions of particular communities while in others it is probably more accurate to say the map shows "potential" distribution of the communities. In some cases the nomenclature used reflects dominant species composition while in others it reflects habitat conditions.

Community/Habitat Types

1. Sphagnum seep community

The Sphagnum seep community is found on small seepage areas, usually where there is seepage across a sandstone pavement outcrop or where a small shallow springfed stream flows across a rock-bottomed rivulet. Such areas are well developed in a discontinuous pattern around the rimlines of the mountaintop and probably reach their highest species diversity where in full sun. Some of these seeps, however, occur in light to heavy shade.

A dominant feature of the vegetation of these boggy areas is Sphagnum spp., Peatmoss. Associated with the peatmosses are numerous graminoids, including members of the genera Juncus, Carex, Rhynchospora, and several grass genera. Some areas support a diverse assemblage of herbaceous species having colorful flowers.

Palmer (1927) obviously collected from examples of this community: "...a boggy area has developed, where were collected a Quillwort (Isoetes butleri) and Sphagnum moss, besides several interesting flowering plants. A species of Meadow beauty (Rhexia interior) and the Closed Gentian (Gentiana clausa) and Iris cristata were found along another brooklet flowing in the other direction....About some of the springs and on dripping ledges, Sphagnum moss is abundant, with a variety of ferns, one or two Orchids and various other moisture-loving plants." Nomenclatural changes through the years have made some of Palmer's scientific names obsolete but the plants remain the same. The Closed gentian he referred to is G. saponaria and it persists along with the Yellow fringed orchid (Platanthera ciliaris) and Meadow beauty at the smallsphagnum-dominated community at Dripping Springs. Sometimes the Ragged fringed orchid (Platanthera lacera) is locally abundant in this community. Similarly, the Quillwort also persists at a few sites on the south rim.

This community is of major interest because it sometime provides suitable habitat for Small-headed pipewort (Eriocaulon kornickianum). This diminutive wetland species once grew at Dripping Springs and at two other localities close by, but it has not been seen on the mountaintop for several years, although suitable habitat possibly persists (see discussion of species elsewhere in paper). A number of these seeps are known, both on the north and south rims, and most are very small in extent.

Small very small seeps have been seen on or near the north rimline in Section 21 and on the south in Sections 21, 22, and 23. These are in addition to the larger ones at Dripping Springs and on FS 1606 between Brown Springs and Dripping Springs.

2. Mesic oak-hickory community

White oak (Quercus alba), Northern red oak (Quercus rubra), and hickories (Carya glabra, C. ovata, and C. cordiformis) are common dominants in this forest type, mainly found on north slopes and shaded, moist ravines. Many other forest canopy species occur here: Black oak (Quercus velutina), Blackgum (Nyssa sylvatica), Black walnut (Juglans nigra), Sugar maple (Acer saccharum), Cucumber magnolia (Magnolia acuminata), Black locust (Robinia pseudo-acacia), and Basswood (Tilia americana), and others. On especially rich and protected sites Yellow-wood (Cladrastis kentukea) is found. Common understory trees include Serviceberry (Amelanchier arborea), Hophornbeam (Ostrya virginiana), and Ohio buckeye (Aesculus glabra), here a shrubby plant with small leaves and light bark and appearing to be intermediate between typical glabra and var. arguta. Shrubs include Spicebush (Lindera benzoin), Prickly gooseberry (Ribes cynosbati), Bladdernut (Staphylea trifolia), Devil's walkingstick (Aralia spinosa), and Wafer ash (Ptelea trifoliata). Herbaceous plants are extremely diverse and include several species of special concern: Ozark spiderwort (Tradescantia ozarkana), Wood's false hellebore (Veratrum woodii), Flypoison (Amianthium muscaetoxicum), Toothwort (Dentaria laciniata), Bloodroot (Sanguinaria canadensis), Doll's eye (Actaea pachypoda), Delphinium (Delphinium tricornis), Epling's stachys (Stachys eplingii), Dutchman's breeches (Dicentra cucullaria), numerous species of Violet (Viola spp.), etc. The rare Carex pennsylvanica is associated with the forest floor in this community type.

Talus slopes and rock streams are abundant on the upper slopes of the north side of the mountain, and they are in contact with the Mesic oak-hickory community. These rock piles are marked by considerable seepage in many cases and they often support significant populations of Leafcup (Polymnia canadensis) and Fox grape (Vitis vulpina), Prickly gooseberry, Hydrangea (Hydrangea arborescens), and other shrub species. The Rocky Mountain woodsia (Woodsia scopulina var. appalachiana) also may be found locally on the rock piles.

The Mesic oak-hickory community, as visualized here, extends across a broad gradient in terms of moisture. At its best development, on upper, shaded north-facing slopes and in protected drainages, it is marked by high species diversity and very moist soil conditions. On lower slopes and somewhat drier areas it is marked by lower species diversity. At its lower limits on the north- and east-facing slopes it comes into contact with disturbed pine-dominated communities and forms a mixed pine-hardwood community.

3. Mesic bluffline community

The Mesic bluffline community, as here defined, is a forest community and possibly is separated from the Mesic oak-hickory community only on a rather superficial and artificial basis. The presence of the outcropping bluffline is a significant feature of the community and it seems to justify separation of

the community from the Mesic oak-hickory type. Typically, the dominant canopy species in the Mesic bluffline community are largely White oak, Northern red oak, Bitternut (Carya cordiformis), and Pignut hickory. The community is concentrated along the northern rim of the mountaintop, where it intergrades with both the Mesic oak-hickory community and the Xeric sandstone glade community. This community is noteworthy as the habitat for the Maple-leaved oak (Quercus shumardii var. acerifolia) on a local basis. Also, this community has significant areas high cover value by shrubs, including Mock-orange (Philadelphus pubescens), Wafer ash (Ptelea trifoliata), Ninebark (Physocarpus intermedius), Raspberry (Rubus occidentalis), Fringe tree (Chionanthus virginicus), and Prickly gooseberry (Ribes cynosbati).

Especially fine examples of the Mesic bluffline community are in Sections 20, 21, 22, and 23.

Moist rock outcrops, including both small ledges and prominent blufflines on the north and east sides, sometimes are associated with this community and they support a distinctive community having a high species diversity of ferns. Hay-scented fern (Dennstaedtia punctilobula) and Rocky Mountain woodsia are two rarities associated with the community and having a high frequency in it. Columbine (Aquilegia canadensis) is another common plant on the moist bluff faces.

4. Scrub oak community

Around the rim of the mountaintop, particularly on the west end of the mountain but also locally elsewhere, are some outstanding examples of stunted oak woodlands dominated by either Blackjack oak (Quercus marilandica) or Post oak (Q. stellata) or a combination of both. These stands often form nearly impenetrable thickets of heavily fruiting trees that are no more than 8-10 feet high on rock outcrops with thin soil development. The age of these plants is not known but in some cases they appear to be very old. The best development of the community is on the thin soils of pavement rock outcrops rimming the mountain. In the former old fields areas on the west end of the mountain (see Figure 2), where soils are a bit thicker, it appears the community has advanced from the rimline and trees are larger in size than on the rimline.

The Blackjack oak of these scrub oak communities is a variant showing a small leaf with a deeply 3-lobed margin. Demaree (personal conversations with me on Magazine Mountain over a period of about fifteen years) always referred to the trees as the "montane form" of Blackjack oak. He indicated that Palmer always referred to the Magazine Mountain plants by that term and that "and all the other old-timers" also did. The plants are considered by the author of this report as typical of the results of introgressive hybridization between Blackjack oak and Black oak. The same phenomenon has been seen on oak savannah communities elsewhere in Northwest Arkansas, although the stunted pure stands have not been seen elsewhere in conditions of such high quality.

Small "islands" of Lowbush huckleberry (Vaccinium pallidum) often occur in close association with the scrub oak community. Also, this community relates closely to the prairie-like openings associated with the Juniper-hardwoods

woodland community. Patches of grasses, often dominated by several species of bluestems (Andropogon spp.), are common associates with this community.

Some of the best examples of the Scrub oak community are on or near the north rimline in Sections 20, 21, and 22.

5. Xeric oak-hickory community

On the dry south slopes, particularly at higher elevations, communities dominated by Post oak and/or Blackjack oak of normal size and appearance are of local importance. White oak sometimes is an important component of this community, particularly in drainages and other areas having considerable runoff. Locally, Shortleaf pine often is scattered among the oaks. Other tree species include Winged elm (Ulmus alata) and Black hickory (Carya texana). Shrub species include huckleberries (Vaccinium spp., especially V. arboreum) and Carolina rose (Rosa carolina). The shrub Andrachne phyllanthoides is locally abundant on shaly ledges and in association with some of the seasonal drainages. Herbaceous plants in this community are sparse and while the species diversity is low they often provide considerable color in openings. Especially prevalent are numerous representatives of the grass, legume, and composite families. Tickseeds (Coreopsis spp.), goldenrods (Solidago spp.), sunflowers (Helianthus spp.), asters (Aster spp.), and Blue sage (Salvia azurea) are abundant, especially on bluffs and ledges and in openings that have experienced past disturbance by either man or natural causes.

To some extent the Xeric oak-hickory community intergrades with the Scrub oak community. Generally, however, the Xeric oak-hickory community as defined here is marked by a higher species diversity than the Scrub oak community. Also, the Scrub oak community is largely restricted to the north rimline and extreme west end of the mountain, in Sections 20, 21, and 22. The Xeric oak-hickory community is extensive on the south side of the mountain, particularly on steep upper slopes above 2000 feet elevation. Below 1600 feet on the south side Shortleaf pine is a dominant species over large acreage and the transitional zone at 1600-2000 feet often is a mixed pine-hardwood forest type.

6. Shortleaf pine-hardwood community

The Shortleaf pine-hardwoods community probably was more extensive on the south slopes than anywhere else at the time white man arrived on the scene. On the other hand, fire may have allowed it to be present on the lower north slopes just as is the case today. The advent of modern timber practices, combined with other disturbance factors by both man and natural causes, though, probably has resulted in an increase of the community at least locally. This is a community marked by low species diversity in all strata. It has many similarities with the Dry oak-hickory community so far as species composition is concerned. One colorful feature of this community is the occurrence of large patches of Birdfoot violet (Viola pedata) in early spring. Shaly outcrops and openings in the woods often show large concentrations of this species. Other herbaceous species are similar to those found in the Xeric oak-hickory type.

7. Juniper-hardwood woodlands community

The south rim of the mountain is noteworthy for its Juniper-hardwood woodlands vegetation type. The Juniper-hardwood woodlands are dominated by Eastern red-cedar (Juniperus virginiana) in most cases, but also occurring here are Post oak, Blackjack oak, Winged elm, and Gum bumelia (Bumelia lanuginosa), all of which usually appear as trees with a twisted and stunted growth form. Where Eastern red-cedar is absent or present in only small numbers this community intergrades imperceptibly with the Scrub oak community. Fringe tree (Chionanthus virginicus) and Farkleberry (Vaccinium arboreum) are common associates that sometimes reach tree size but usually are shrubs.

Associated with the Juniper-hardwood woodlands are graminoid-dominated areas that have been visualized as communities in themselves, usually referred to as prairies, hillside prairies, or prairie-like openings (Palmer, 1927; Tucker, 1972; etc.). Often these openings are large in size and characterized by only occasional scattered trees. Important species here are Big bluestem (Andropogon gerardi), Little bluestem (Andropogon scoparius), Broomsedge (Andropogon virginicus), Eastern gama grass (Tripsacum dactyloides), lovegrasses (Eragrostis spp.), and panic-grasses (Panicum spp.). Forbs are abundant also and include tickseeds (Coreopsis spp.), goldenrods (Solidago spp.), blazing stars (Liatris spp.), asters (Aster spp.), sunflowers (Helianthus spp.), and rosinweeds (Silphium spp.). Locally, as on the western end of the mountaintop, the Western wallflower (Erysimum capitatum) is a part of this community.

The Juniper-hardwood woodlands community extends in a narrow and broken band along the south rimline, where well developed in Sections 20, 21, 22, and 23. As mentioned above the community often interdigitates with graminoid-dominated areas which usually are dry. On the other hand, the Sphagnum seep community also occurs in close association with the community wherever there is sufficient seepage to support it.

The Rufous-crowned sparrow, found very sparingly in Arkansas, is associated with the Juniper-hardwood woodlands community on Magazine Mountain in Sections 20 and 21.

8. Pine Plantations

Pine plantations have been established on the lower flanks of Magazine Mountain on all sides. They are, of course, dominated by Shortleaf pine. These plantations undoubtedly serve as a seed bank for local migration of pine onto suitable sites. Associated species show varying degrees of similarity with the Shortleaf pine-hardwood and Xeric oak-hickory communities depending on the age of the plantation and the management regime to which it has been subjected.

9. Xeric sandstone glade community

The Xeric sandstone glade community is best developed on ledges and outcrops in close association with the Juniper-hardwood woodlands community a discontinuous pattern along the southern rim of the mountaintop, although it

also may be seen along the northern rim in areas that do not support a forest canopy. This community is noted for its sparse but colorful assemblage of forb species. Some of the components include Paronychia (Paronychia virginica var. scoparia), a knotweed (Polygonum tenue), Pinweed (Lechea tenuifolia), Larkspur (Delphinium carolinianum), blazing stars (Liatris spp. but especially L. squarrosa), and several species of tickseed (Coreopsis spp.).

Some especially fine examples of the Xeric sandstone glade community are in Section 22 on both the north and south rimlines of the mountain.

The Ouachita leadplant (Amorpha ouachitensis) often is associated with this community and the transitional zone between it and other community types.

10. Successional weedy communities

As mentioned by Tucker (1972) the list of Pyle (1939) included numerous weedy successional species that are today either very uncommon or unknown on the mountain. This is to be expected, particularly in view of the high degree of disturbance associated with the mountain in the early years of this century. Old fields largely have grown up into more stable communities and roadsides also have become fairly well stabilized, usually having strong relationships with the adjacent natural community. Significant numbers of weedy species still can be found on the mountain, however, particularly on those areas still receiving regular disturbance from visitors, the Recreation Area sites.

11. Remnants of former cultivation

The Magazine Mountain Ranger District had the beginnings of its Federal government relationships in 1934 when the Resettlement Administration began purchasing land within the composite boundary considered submarginal for farming (USDA, Forest Service, 1971). At that time several families remained on the mountain, eking out a row crop-based subsistence income. At yet an earlier time substantial farm holdings had been established on the mountaintop and several of them supported large orchards of various fruit trees. Numerous remnants of those former homes and farms persist on the mountain in the form of once-cultivated plants. Thickets of cultivated plums (Prunus spp.), Mahaleb cherry (Prunus mahaleb), Apple (Malus pumila), Pear (Pyrus communis), Japonica (Chaenomeles japonica), Spiraea (Spiraea spp.), Iris (Iris germanica), Daylily (Hemerocallis fulva), and other plants are among the list of indicators of past habitation and cultivation. Each of the recreation areas on the mountain are located at old farm sites; therefore, the remnants of former cultivation may be seen most easily at these sites although there are also other places they occur.

Present Status of Special Plant Species on Magazine Mountain

During the course of this study a search was made for a total of 25 plant taxa designated as "special plant species'" and either already known from the mountain or deemed possible members of its flora. This list of taxa was compiled from (1) a list of species of special concern maintained by the Arkansas Natural Heritage Commission, (2) plants maintained on the PETS (proposed, endangered, threatened, sensitive) list of the Ozark-St. Francis National Forests, and (3) additional species considered to be indicative of significant habitats or ecological conditions of very local occurrence on Magazine Mountain. In addition, a watchful eye was kept for a number of other species not known from the mountain but possibly having suitable habitat on the mountain.

The checklist of Tucker (1972) was examined and attempts were made to make additions to the list. Additions (and a few corrections) were made to the list, but none of the additions or corrections are considered of particular significance. Certainly none of the additions appear on the Arkansas Natural Heritage Commission list of species of special concern.

The following list of 25 taxa outlines their known areas of distribution on Magazine Mountain, or in the cases of those not found the area(s) of suitable habitat. Detailed accounts of the population locations may be found on the "Arkansas Special Plant Survey Form" completed for each population. Locations are shown in a series of maps, an individual map for each taxon. Where applicable the mapped localities distinguish between populations found during this study and historical populations not relocated during this study (where exact locations were known). Extant populations are marked with a black dot, in the case of localized populations. More extensive populations are marked in solid black ink outline patterns. Apparently extirpated sites are marked with a black triangle.

References Cited

- Arkansas Geological Commission and U.S. Geological Survey. 1976. Geologic map of Arkansas. Arkansas Geological Commission, Little Rock, Arkansas, and U.S. Geological Survey, Denver, Colorado.
- Arkansas Department of Planning. 1974. Arkansas natural areas plan. Arkansas Department of Planning, Little Rock.
- Clark, J. M. 1977. Geology and minerals of the Magazine Mountain unit of the Ozark National Forest. A typed report submitted to Supervisor's Office, Ozark National Forest, Russellville, Arkansas.
- Cphoon, R. R., and V. K. Vere. 1988. Blue Mountain Dam and Magazine Mountain, Arkansas. Geological Society of America Centennial Field Guide, South-Central Section. Pages 243-248.
- Croneis, C. 1930. Geology of the Arkansas Paleozoic Area. Bulletin No. 3. Arkansas Geological Survey, Little Rock.
- Green, Garvin. 1980. Mount Magazine. Published privately by author.
- Hess, W. J. 1989. Letter to Gary Tucker, dated 15 August 1989.
- Lookingbill, S. M., M. K. Cleaveland, and M. J. Guccione. 1987. Botanical evidence for holocene movement of rock streams in Arkansas. Proc. Ark. Acad. Sci. 41:63-68.
- Moore, D. M. 1941. Some noteworthy fern communities of Arkansas. Amer. Fern J. 31:63-71.
- Nuttall, T. 1821. A journal of travels into Arkansas territory during the year 1819, with occasional observations on the manners of the aborigines. T. W. Palmer, Philadelphia, Pennsylvania.
- Palmer, E. J. 1927. On Nuttall's trail through Arkansas. J. Arnold Arb. 8:24-55.
- Peck, J. H. 1986. Dryopteris carthusiana at Mt. Magazine, Logan County, Arkansas. Proc. Ark. Acad. Sci. 40:94.
- Peck, J. H., and C. Peck. 1987. Status report on the fern Woodsia scopulina in Arkansas. Proc. Ark. Acad. Sci. 41:112. Pyle,
- Rogers, Catherine Eikleberry. 1979. Moments of Mt. Magazine. Published privately by the author.
- Taylor, W. C. 1984. Arkansas ferns and fern allies. Milwaukee Public Museum, Milwaukee, Wisconsin.

- Tucker, G. 1972. The vascular plants of Magazine Mountain. Contract report submitted to Supervisor's Office, Ozark National Forest, Russellville, Arkansas.
- Tucker, G. 1976. A guide to the woody flora of Arkansas. Unpublished doctoral dissertation. University of Arkansas, Fayetteville, Arkansas.
- Tucker, G. 1980. Inventory of threatened and endangered plant species of Ozark-St. Francis National Forests. Contract report. Manuscript submitted to U.S. Forest Service, Atlanta, Georgia.
- USDA, Forest Service. 1971. Untitled and undated document text relating to the history of the Magazine Ranger District. Mailed to Gary Tucker on 16 November 1971 by Jerry Alexander. Ozark-St. Francis' National Forests. Russellville, Arkansas.
- USDA, Forest Service. 1980. Mt. Magazine Recreation Development Level. Final Environmental Impact Statement. Ozark-St. Francis National Forests. Russellville, Arkansas.
- Vere, V. K. 1986. Possible sequential stages in slope-cliff development on the uppermost regions of Mt. Magazine, Arkansas. Geol. Soc. of Amer. Abstracts with Programs 18:270.

APPENDIX B:

Vegetation

- Part I - Botanical Survey: Methodology and Field Studies
- Part II - List of Plant Species Observed During 1991 Field Studies

APPENDIX B:

Part I - Botanical Survey of Mt. Magazine 1991: Methodology

Methodology

Available literature and information on the flora of Mt. Magazine and of PETS species on the Mountain were reviewed from the Spring 1990 through the Spring of 1991. This review was completed to familiarize the team botanist with the flora of the Mountain and its special elements, and to become familiar with the locations of PETS species and type habitats. Numerous field reconnaissances were completed during the Spring through the Winter of 1990 as part of other activities associated with the project (e.g., development of alternatives). These field reconnaissances served to familiarize the project botanist with the distribution of plant communities and specific elements on the Mountain.

Intensive field surveys of the flora of Mt. Magazine were completed from March 1991 through October 1991 and in June 1992 in the areas in which developments were proposed. Areas in which intensive field surveys were completed were flagged in the Spring of 1991 with the exception of existing roads, corridors, trails (e.g., the water line corridor on the south side of the Mountain, road to Signal Hill, etc.) and the proposed rim hiking trail and water line access roads. The proposed rim hiking trail was flagged by the Arkansas Department of Parks and Tourism in August 1991. The proposed water line access road was flagged in June 1992. Six intensive field surveys of varying durations were conducted on the Mountain during 1991. One survey was completed on the Mountain in 1992. Surveys were conducted primarily in the Spring when turn over in flowering of species was the greatest. Botanical surveys of the Mountain were completed on the following dates: 27 March 1991, 9 April 1991, 22 April 1991, 30 April-1 May 1991, 14-16 May 1991, 17 October 1991, and 29 June 1992. All areas were surveyed at least once during the 1991/1992 field seasons, however, the majority of sites were surveyed greater than 50% of the time. Each area was surveyed by completing a walk over of the flagged area where the proposed developments were located. The purpose of the walk over was to inventory botanical species within the area and to search all potential habitats for PETS species. Botanical species observed in the flagged areas were recorded and the phenological condition (i.e., vegetative stage, in bud, in flower, in fruit) of the species was recorded in most cases. Most species were identified on site. Those species which could not be identified on site were collected and keyed in the laboratory at FTN according to Steyermark (1963). Specimens collected were easily identified in the laboratory and did not require verification at the herbarium at Arkansas Tech University in Russellville, the principal repository for botanical specimens from Mt. Magazine.

The following table is a checklist of species recorded from Mt. Magazine (Tucker 1972) and identifies those species observed during the completion of the intensive field surveys on the Mountain in 1991.

APPENDIX B:

Part II - List of Plant Species Observed During 1991 Field Studies

PHYLOGENETIC CHECK-LIST OF PLANT SPECIES
RECORDED ON MT. MAGAZINE +

SELAGINELLACEAE

Selaginella apoda (L.) Spring. MEADOW SPIKEMOSS. Tucker 5164.

ISOETACEAE

Isoetes melanopoda Gay & Durieu. QUILLWORT. Pyle 362 (ARK).

OPHIOGLOSSACEAE

Botrychium dissectum Spreng. GRAPEFERN. Pyle 557 (ARK).

Botrychium virginianum (L.) Sw. RATTLESNAKE FERN. Tucker 9105.

OSMUNDACEAE

Osmunda cinnamomea L. CINNAMON FERN. Moore 480082 (ARK).

Osmunda regalis var. spectabilis (Willd.) Gray. ROYAL FERN. Moore 480081 (ARK).

POLYPODIACEAE

Adiantum pedatum L. MAIDENHAIR FERN. Tucker 10208.

* Asplenium platyneuron (L.) Oakes. EBONY SPLEENWORT. Tucker 8783.

Asplenium trichomanes L. MAIDENHAIR SPLEENWORT. Moore 480347.

Athyrium filix-femina (L.) Roth. LADY-FERN. Moore 480092.

Athyrium thelypteroides (Michx.) Desv. Moore 480315 (ARK).

Camptosorus rhizophyllus (L.) Link. WALKING FERN. Tucker 9067.

Cheilanthes lanosa (Michx.) D. C. Eaton. HAIRY LIP-FERN. Tucker 10132 A.

Cheilanthes tomentosa Link. WOOLY LIP-FERN. Moore 23207 (ARK).

Cystopteris fragilis var. protrusa Weatherby. BLADDER FERN. Moore 480077 (ARK).

* Dennstaedtia punctilobula (Michx.) Moore. HAY-SCENTED FERN. Tucker 8601.

Diplazium pycnocarpon (Spreng.) Broun. NARROW-LEAVED SPLEENWORT. Tucker 10209.

Dryopteris marginalis (L.) A. Gray. MARGINAL SHIELD-FERN. Tucker 8600.

Pellaea atropurpurea (L.) Link. CLIFF-BRAKE. Tucker 10210.

Polypodium polypodioides (L.) Watt. LITTLE GRAY POLYPODY. Tucker 9062 A.

Polypodium virginianum L. COMMON POLYPODY. Moore 480305 (ARK).

* Polystichum acrostichoides (Michx.) Schoot. Moore 24163 (ARK).

Pteridium aquilinum (L.) Kuhn. BRACKEN. Tucker 8787.

* Thelypteris hexagonoptera (Michx.) Weatherby. BROAD BEECH-FERN. Tucker 8789.

* Woodsia obtusa (Spreng.) Torr. BLUNT-LOBED WOODSIA. Tucker 9532.

* Woodsia scopulina D. C. Eaton. (including W. appalachiana Taylor).
ROCKY MOUNTAIN WOODSIA. Moore 600083.

PINACEAE

* Pinus echinata Mill. SHORTLEAF PINE. Tucker 8791.

CUPRESSACEAE

* Juniperus virginiana L. RED CEDAR. Tucker 10211.

TYPHACEAE

* Typha latifolia L. COMMON CAT-TAIL. Spivey s.n.

POACEAE (GRAMINEAE)

Agrostis alba L. REDTOP. Tucker 10137.

Agrostis perennans (Walter) Tuckerman. BENT GRASS. Tucker 9932.

Andropogon gerardii Vitman. BLUESTEM. Tucker 10144.

Aristida dichotoma Michx. ^{Scop. 18} THREE AWN GRASS. Tucker 10148.

Brachyelytrum erectum (Schreb.) Beauv. Tucker 10161.

Bromus catharticus Vahl. BROME GRASS. Moore 510081 (ARK).

Bromus commutatus Schrader. BROME GRASS. Iltis 5064 (ARK).

Bromus japonicus Thunb. BROME GRASS. Moore 490446.

Bromus purgans L. BROME GRASS. Tucker 10046 A.

Bromus secalinus L. CHEAT. Tucker 9923.

Cynodon dactylon (L.) Pers. BERMUDA GRASS. Tucker 10205.

Danthonia spicata (L.) Beauv. OAT GRASS. Tucker 10011.

Deschampsia flexuosa (L.) Trin. HAIR GRASS. Tucker 8602.

Digitaria adscendens (H.B.K.) Henr. SOUTHERN CRABGRASS. Tucker 10155.

Echinochloa crus-galli (L.) Beauv. BARNYARD GRASS. Tucker 8810.

Elymus virginicus L. WILD RYE. Tucker 10049.

Eragrostis capillaris (L.) Nees. LOVE GRASS. Palmer 29614 (ARK).

Eragrostis cilianensis (All.) Lutati. STINK GRASS. Moore 490440 (ARK).

Eragrostis intermedia Hitchc. LOVE GRASS. Moore 480041 (ARK).

Eragrostis pectinacea (Michx.) Nees. LOVE GRASS. Palmer 29615 (ARK).

Eragrostis spectabilis (Pursh) Steud. LOVE GRASS. Tucker 10149.

Erianthus contortus Baldwin ex Ell. PLUME GRASS. Moore 470467.

* Festuca elatior L. FESCUE. Tucker 9866.

Festuca octoflora Walter. FESCUE. Tucker 10017.

Festuca obtusa Biehler. FESCUE. Tucker 8613.

Festuca paradoxa Desv. FESCUE. Tucker 10038.

Hordeum pusillum Nuttall. LITTLE BARLEY. Tucker 9483 A.

Hystrix patula Moench. BOTTLEBRUSH GRASS. Tucker 5155.

Leptoloma cognatum (Sch.) Chase. WITCH GRASS. Tucker 10147.

Lolium perenne L. RYE GRASS. Tucker 10146.

Manisurus cylindrica (Michx.) Kuntze. JOINT GRASS. Moore 470623 (ARK).

Melica nitens Nuttall ex Scrib. MELIC GRASS. Tucker 9504.

Muhlenbergia sobolifera (Muhl. ex Willd.) Trin. MUHLY. Moore 470631 (ARK).

Panicum boscii Poir. PANIC GRASS. Tucker 10020.

Panicum depauperatum Muhl. PANIC GRASS. Pyle 750 (ARK).

Panicum dichotomum L. (including P. microcarpon Muhl.). PANIC GRASS.
Pyle 873 (ARK) and Moore 470603 (ARK).

Panicum hians Ell. PANIC GRASS. Moore 470629 (ARK).

Panicum lanuginosum Ell. (including P. huachucae Ashe, P. lindheimeri
Nash, L. praecocius Hitchc. & Chase). PANIC GRASS. Tucker 10051,
Moore 470626 (ARK), Tucker 9867.

Panicum laxiflorum Lam. (including P. xalapense H. B. K.) PANIC GRASS.
Moore 480321 (ARK).

Panicum linearifolium Scrib. PANIC GRASS. Tucker 9887.

Panicum philadelphicum Bernh. ex Trin. PANIC GRASS. Pyle 132 (ARK).

Panicum polyanthus Schult. PANIC GRASS. Tucker 9980 A.

Panicum scoparium Lam. PANIC GRASS. Tucker 9918.

Panicum scribnerianum Nash. PANIC GRASS. Tucker 10147 A.

Panicum virgatum L. PANIC GRASS. Tucker 470648.

Paspalum dissectum L. PASPALUM. Moore 470665 (ARK).

Paspalum floridanum Michx. PASPALUM. Tucker 10150.

Paspalum setaceum Michx. PASPALUM. Moore 480333 (ARK).

* Phleum pratense L. TIMOTHY. Tucker 9939.

* Poa annua L. ANNUAL JUNE GRASS. Pyle 212 (ARK).

Setaria glauca (L.) Beauv. FOXTAIL GRASS. Tucker 9935.

Sorghum halepense (L.) Pers. JOHNSON GRASS. Spivey s.n.

Sphenopholis obtusata (Michx.) Scribn. Tucker 10145.

Sporobolus clandestinus (Spreng.) Hitchc. DROPSEED. Palmer 29630 (ARK).

Tridens flava Hitchc. PURPLETOP. Tucker 10152.

Tridens stricta Nash. Pyle 153 (ARK).

Tripsacum dactyloides L. GAMA GRASS. Tucker 9964.

Uniola latifolia Michx. QUAKING GRASS. Tucker 5168.

CYPERACEAE

- Bulbostylis capillaris (L.) Clarke. HAIR SEDGE. Tucker 8640.
- Carex albursina Sheldon. CARIC SEDGE. Tucker 9099.
- Carex annectens Bicknell. CARIC SEDGE. Tucker 9502.
- Carex bushii Mack. CARIC SEDGE. Tucker 9524.
- Carex communis Bailey. CARIC SEDGE. Palmer 26930 (ARK).
- Carex complanata Torr. & Hook. CARIC SEDGE. Tucker 9872.
- Carex lurida Wahl. CARIC SEDGE. Tucker 9512.
- Carex muhlenbergii Schk. CARIC SEDGE. Tucker 9523.
- Carex oligocarpa Schk. CARIC SEDGE. Palmer 24849 (ARK).
- Carex squarrosa L. CARIC SEDGE. Tucker 10143.
- Cyperus filiculmis Vahl. SEDGE. Tucker 10136.
- Cyperus ovularis (Michx.) Torr. SEDGE. Tucker 10204.
- Eleocharis obtusa var. lanceolata (Fern.) Gilley. SPIKE SEDGE. Tucker 10055.
- Rhynchospora globularis var. recognita Gale. BEAK SEDGE. Tucker 10056.
- * Scirpus atrovirens Willd. BULRUSH. Tucker 10154.

ARACEAE

- Arisaema triphyllum (L.) Torr. INDIAN TURNIP. Tucker 7076.

ERIOCAULACEAE

- Eriocaulon kornickianum Van Heurck & Muell. Arg. PIPEWORT. Moore 4333 (ARK).

COMMELINACEAE

- Commelina communis L. DAYFLOWER. Tucker 9991.
- * Tradescantia ernestiana Anderson & Woodson. SPIDERWORT. Pyle 160 (ARK).
- * Tradescantia ohimensis Raf. SPIDERWORT. Tucker 9531.

Tradescantia ozarkana Anderson & Woodson. SPIDERWORT. Tucker 9547.

* JUNCACEAE

Juncus debilis Gray. RUSH. Tucker 10008.

Juncus diffusissimus Buckl. RUSH. Tucker 9900.

Juncus effusus var. solutus Fern. & Wieg. SOFT RUSH. Tucker 10009.

Juncus interior Wieg. RUSH. Tucker 9881.

Juncus marginatus Rostk. RUSH. Pyle 738 (ARK).

Luzula bulbosa (Wood) Rydb. WOOD RUSH. Tucker 7059.

LILIACEAE

Allium canadense var. mobilense (Regel) M. Ownbey. WILD ONION. Tucker 5515.

Allium cernuum Roth. NODDING ONION. Tucker 8877.

Amianthium muscaetoxicum (Walter) Gray. FLY POISON. Tucker 9487.

Asparagus officinalis L. ASPARAGUS. Tucker 9977.

Camassia angusta (Engelmann & Gray) Blankinship. WILD HYACINTH. Demaree 2765 (ARK).

* Camassia scilloides (Raf.) Cory. WILD HYACINTH. Buchholz 828 (ARK).

* Hemerocallis fulva var. kwanso Regel. DAYLILY. Tucker 10130.

Erythronium americanum Ker. TROUT LILY. Tucker 9073.

* Nothoscordum bivalve (L.) Britton. FALSE GARLIC. Wilkins s.n.

* Polygonatum biflorum (Walt.) Britt. SOLOMON'S SEAL. Tucker 10004.

* Smilacina racemosa (L.) Desf. FALSE SOLOMON'S SEAL. Tucker 8330.

Smilax bona-nox L. SAW BRIER. Wilkins & Tucker s.n.

* Smilax glauca Walt. SMILAX. Tucker 8641.

* Smilax herbacea var. lasioneuron (Hook.) DC. CARRION VINE. Tucker 8837.

Trillium recurvatum Beck. TRILLIUM. Buchholz 840 (ARK).

* Trillium viridescens Nutt. TRILLIUM. Tucker 9051.

- * Uvularia grandiflora Smith. BELLWORT. Tucker 9111.
- Veratrum woodii Robbins. FALSE HELLEBORE. Tucker 9492.
- * Yucca arkansana Trel. YUCCA. Whiting 86.
- Zygadenus nuttallii Gray. DEATH CAMAS. Tucker 7070.

AMARYLLIDACEAE

- * Hypoxis hirsuta (L.) Cov. STAR GRASS. Tallant 96.

DIOSCOREACEAE

- * Dioscorea batatas Decne. CINNAMON VINE. Tucker 10138.
- * Dioscorea villosa L. WILD YAM. Tucker 9498.

IRIDACEAE

- * Iris cristata Ait. WILD IRIS. Tucker 9050.
- Iris germanica L. FLAG. Tucker 9520.
- Sisyrinchium bermudiana L. em. Fern. BLUE-EYED GRASS. Moore 410120 (ARK).
- Sisyrinchium campestre Bickn. BLUE-EYED GRASS. Pyle 405 (ARK).

ORCHIDACEAE

- Aplectrum hyemale (Muhl.) Torr. PUTTYROOT. Moore 450250 (ARK).
- Cypripedium calceolus var. pubescens (Willd.) Correll. Tom Clark (sight ident.
- Habenaria ciliaris (L.) Br. YELLOW FRINGED ORCHID. Tucker 8637.
- Habenaria lacera (Michx.) Lodd. RAGGED FRINGED ORCHID. Tucker 9499.
- Malaxis unifolia Michx. GREEN ADDER'S MOUTH. Tucker 8591.

SALICACEAE

- > Populus deltoides Marsh. COTTONWOOD. Tucker 8801.
- > Salix caroliniana Michx. WARD'S WILLOW. Tucker 9979.
- Salix humilis Marsh. PRAIRIE WILLOW. Tucker 9053.

JUGLANDACEAE

- * Carya cordiformis (Wang.) K. Koch. BITTERNUT HICKORY. Tucker 8770.
- Carya leiodermis Sarg. SWAMP HICKORY. Palmer 26424 (ARK).
- * Carya ovata (Mill.) K. Koch. SHAGBARK HICKORY. Tucker 8771.
- Carya texana Buckl. BLACK HICKORY. Tucker 8772.
- * Juglans nigra L. BLACK WALNUT. Tucker 8989.

BETULACEAE

- Alnus serrulata (Ait.) Willd. COMMON ALDER. Tucker 10286.
- Betula nigra L. RIVER BIRCH. Tucker 10294.
- * Carpinus caroliniana Walt. IRONWOOD. Tucker 10288.
- * Ostrya virginiana (Mill.) K. Koch. EASTERN HOP-HORNBEAM. Tucker 8842.

FAGACEAE

- * Castanea ozarkensis Ashe. OZARK CHINKAPIN. Tucker 9086.
- * Quercus alba L. WHITE OAK. Tucker 7080.
- * Quercus falcata Michx. SOUTHERN RED OAK. Tucker 10287.
- * Quercus marilandica Muench. BLACKJACK OAK. Tucker 8849.
- * Quercus muhlenbergii Engelm. CHINKAPIN OAK. Tucker 9080.
- Quercus nigra L. WATER OAK. Tucker 8861.
- * Quercus shumardii var. acerifolia Palmer. MAPLE-LEAVED OAK. Tucker 8646.
- * Quercus stellata Wang. POST OAK. Tucker 8850.
- * Quercus velutina Lam. BLACK OAK. Tucker 8782.
- X Quercus fernowii Trel. (Q. alba X stellata). FERNOW OAK. Tucker 9981.

ULMACEAE

- Celtis tenuifolia var. georgiana (Small) Fern. & Schub. DWARF HACKBERRY.
Tucker 9951.
- * Ulmus alata Michx. WINGED ELM. Tucker 8805.

- * Ulmus rubra Muhl. SLIPPERY ELM. Tucker 9862.

MORACEAE

Maclura pomifera (Raf.) Schneid. OSAGE ORANGE. Tucker 10289.

Morus rubra L. RED MULBERRY. Tucker 8855.

URTICACEAE

Parietaria pensylvanica Muhl. PELLITORY. Tucker 9540.

ARISTOLOCHIACEAE

➤ Aristolochia tomentosa Sims. PIPE VINE. Tucker 8845.

POLYGONACEAE

Polygonum aviculare L. KNOT-WEED. Tucker 10300.

Polygonum scandens L. CLIMBING FALSE BUCKWHEAT. Tucker 10207.

Polygonum tenue Michx. Tucker 10290.

Polygonum virginianum L. JUMP SEED. Tucker 10016.

- * Rumex acetosella L. SHEEP SORREL. Tucker 9525.

Rumex crispus L. CURLY DOCK. Tucker 10202.

Rumex obtusifolius L. DOCK. Tucker 10014.

CHENOPODIACEAE

- * Chenopodium album L. LAMB'S QUARTERS. Tucker 10018.

Chenopodium ambrosioides L. WORMSEED. Tucker 10140.

AMARANTHACEAE

Amaranthus spinosus L. SPINY PIGWEED. Tucker 10295.

PHYTOLACCACEAE

Phytolacca americana L. POKEWEED. Tucker 9548.

AIZOACEAE

Mollugo verticillata L. INDIAN CHICKWEED. Tucker 10206.

PORTULACACEAE

* Claytonia virginica L. SPRING BEAUTY. Tucker 9078.

* Talinum calycinum Engelm. FAMEFLOWER. Tucker 10292.

CARYOPHYLLACEAE

Cerastium brachypodum (Engelm.) Robins. CHICKWEED. Pyle 612 (ARK).

Cerastium viscosum L. MOUSE-EAR CHICKWEED. Pyle 313 (ARK).

Paronychia fastigiata (Raf.) Fern. WHITLOW-WORT. Pyle 579 (ARK).

* Paronychia virginica Spreng. WHITLOW-WORT. Tucker 3630.

Saponaria officinalis L. BOUNCING BET. Tucker 10200.

Silene antirrhina L. CATCHFLY. Pyle 746 (ARK).

Silene stellata (L.) Ait. STARRY CAMPION. Tucker 10201.

* Silene virginica L. FIRE PINK. Tucker 9054.

Stellaria media (L.) Cyr. CHICKWEED. Williamson & Tucker s.n.

RANUNCULACEAE

Anemone caroliniana Walt. CAROLINA ANEMONE. Pyle 618 (ARK).

Anemone decepetala var. heterophylla (NUTT.) Britt. ANEMONE.
Buchholz 771 (ARK).

* Anemone virginiana L. ANEMONE. Tucker 9490.

Aquilegia canadensis L. COLUMBINE. Tucker 9507.

Clematis versicolor Small. LEATHER FLOWER. Tucker 8333.

Clematis viorna L. LEATHER FLOWER. Tucker 5107.

Clematis virginiana L. VIRGIN'S BOWER. Tucker 10002.

Delphinium carolinianum Walt. CAROLINA LARKSPUR. Tucker 7075.

* Delphinium tricorne Michx. DWARF LARKSPUR. Tucker 9049.

- * Ranunculus fascicularis Muhl. BUTTERCUP. Pyle 220 (ARK).
- Ranunculus harveyi (Gray) Britt. HARVEY'S BUTTERCUP. Tucker 7065.
- Ranunculus micranthus Nutt. CROWFOOT. Pyle 204 (ARK).

BERBERIDACEAE

- Caulophyllum thalictroides (L.) Michx. BLUE COHOSH. Tucker 9072.
- * Podophyllum peltatum L. MAY APPLE. Tucker 9083.

ANNONACEAE

- Asimina triloba (L.) Dunal. PAWPAW. Tucker 8853.

LAURACEAE

- Lindera benzoin (L.) Bl. SPICEBUSH. Tucker 9088.
- * Sassafras albidum (Nutt.) Nees. SASSAFRAS. Tucker 8798.

PAPAVERACEAE

- Sanguinaria canadensis L. BLOODROOT. Tucker 9070.

FUMARIACEAE

- Corydalis crystallina Engelm. SCRAMBLED EGGS. Tucker 10299.
- Corydalis micrantha (Engelm) Gray. SCRAMBLED EGGS. Tucker 9060 A.
- Dicentra cucullaria (L.) Bernh. DUTCHMAN'S BREECHES. Tucker 9071.

CRUCIFERAE

- * Arabis canadensis L. SICKLEPOD. Tucker 10293.
- Arabis hirsuta var. pycnocarpon (M. Hopkins) Rollins. ROCK CRESS. Tucker 7068.
- Arabis missouriensis Greene. ROCK CRESS. Pyle 253 (ARK).
- * Capsella bursa-pastoris (L.) Britt. SHEPHERD'S PURSE. Tucker 10199.
- * Dentaria laciniata Muhl. TOOTHWORT. Tucker 9081.
- Draba brachycarpa Nutt. WHITLOW GRASS. Moore 48093 (ARK).
- Erysimum arkansanum Nutt. WESTERN WALLFLOWER. Tucker 7079.

- * Lepidium virginicum L. PEPPER GRASS. Tucker 10190.

CRASSULACEAE

Sedum ternatum Michx. STONECROP. Pyle 200 (ARK).

SAXIFRAGACEAE

- * Heuchera hirsuticaulis (Wheelock) Rydb. ALUM ROOT. Tucker 9505.

- * Hydrangea arborescens L. WILD HYDRANGEA. Tucker 8846.

- * Philadelphus pubescens Schrad. MOCK ORANGE. Tucker 5130.

- * Ribes cynosbati L. PRICKLY GOOSEBERRY. Tucker 8839.

Saxifraga virginicensis Michx. SAXIFRAGE. Tucker 9094 A.

ROSACEAE

Agrimonia rostellata Wallr. WOODLAND AGRIMONY. Tucker 8639.

- * Amelanchier arborea (Michx. f.) Fern. SARVIS. Tucker 8792.

Crataegus crus-galli var. bellica (Sarg.) Palmer. HAWTHORN. Demaree 22832 (GH).

Crataegus disjuncta var. magnifolia (Sarg.) Palmer. HAWTHORN. Demaree 22853 (GH).

- * Crataegus marshallii Egg. HAWTHORN. Tucker 9945.

- * Crataegus spathulata Michx. HAWTHORN. Tucker 8793.

Crataegus uniflora Moench. HAWTHORN. Tucker 9948.

- * Fragaria virginiana Duchesne. STRAWBERRY. Tucker 9936.

Geum canadense Jacq. AVENS. Tucker 5124.

Geum vernum (Raf.) T. & G. AVENS. Tucker 9875.

Gillenia stipulata (Muhl.) Trel. AMERICAN IPECAC. Tucker 8580.

- * Physocarpus opulifolius var. intermedius (Rydb.) Robins. NINEBARK. Tucker 8655.

- * Potentilla simplex Michx. CINQUEFOIL. Pyle 254 (ARK).

- * Prunus americana Marsh. WILD PLUM. Tucker 8804.
- Prunus angustifolia Marsh. CHICKASAW PLUM. Tucker 9059.
- Prunus mahaleb L. PERFUMED CHERRY. Tucker 9517.
- * Prunus mexicana Watson. WILD PLUM. Tucker 10298.
- * Prunus serotina Ehrh. WILD CHERRY. Tucker 8807.
- * Rosa carolina L. (including R. subserrulata Rydb.) CAROLINA ROSE.
Tucker 9537.
- Rosa setigera Michx. CLIMBING ROSE. Tucker 9982.
- * Rubus argutus Link. BLACKBERRY. Tucker 9926.
- Rubus discolor Weihe & Nees. (including R. procerus Mueller). BLACKBERRY.
Tucker 9516.
- * Rubus trivialis Michx. DEWBERRY. Tucker 10297.

HAMAMELIDACEAE

- Hamamelis vernalis Sarg. VERNAL WITCH-HAZEL. Tucker 9959.
- Hamamelis virginiana L. WITCH-HAZEL. Tucker 8802.
- * Liquidambar styraciflua L. SWEETGUM. Tucker 8843.

PLATANACEAE

- * Platanus occidentalis L. SYCAMORE. Tucker 9971.

LEGUMINOSAE

- Amorpha fruticosa L. INDIGO. Palmer 23242 (ARK).
- Amorpha glabra Desf. INDIGO. Palmer 24187 (ARK).
- Amorpha virgata Small. INDIGO. Tucker 9533.
- Astragalus canadensis L. MILK-VETCH. Tucker 9980.
- Astragalus mexicanus (DC.) Rydb. GROUND PLUM. Pyle 416 (ARK).
- Baptisia leucantha T. & G. WILD INDIGO. Tucker 9931.
- * Baptisia leucophaea Nutt. WILD INDIGO. Tucker 5181.

- Cassia fasciculata Michx. SENSITIVE PEA. Tucker 9889.
- Cassia nictitans L. SENSITIVE PEA. Tucker 10301.
- * Cercis canadensis L. REDBUD. Tucker 9536.
- Cladrastis lutea Michx. YELLOWWOOD. Tucker 9103.
- Coronilla varia L. CROWN VETCH. Tucker 8332.
- Crotalaria sagittalis L. RATTLEBOX. Pyle 760 (ARK).
- Desmodium glabellum DC. BEGGAR'S TICK. Spivey s.n.
- Desmodium glutinosum (Muhl. ex Willd.) Wood. BEGGAR'S TICK. Tucker 9879.
- Desmodium laevigatum (Nutt.) DC. BEGGARS TICK. Tucker 9969.
- Desmodium marilandicum (L.) DC. BEGGAR'S TICK. Tucker 9880.
- Desmodium nudiflorum (L.) DC. BEGGAR'S TICK. Pyle 891 (ARK).
- Desmodium paniculatum (L.) DC. BEGGAR'S TICK. Tucker 8809.
- Lathyrus latifolius L. SWEET PEA. Tucker 9519.
- Lespedeza capitata Michx. BUSH CLOVER. Tucker 10039.
- Lespedeza cuneata (Dumont) G. Don. SERICEA. Tucker 8315.
- Lespedeza hirta (L.) Hornem. BUSH CLOVER. Tucker 8316.
- Lespedeza procumbens Michx. TRAILING BUSH CLOVER. Palmer 29608 (ARK).
- Lespedeza violacea (L.) Pers. PRAIRIE CLOVER. Pyle 176 (ARK).
- Lespedeza virginica (L.) Britt. SLENDER BUSH CLOVER. Tucker 10198.
- * Melilotus alba Desf. WHITE SWEET CLOVER. Tucker 9993.
- Petalostemum candidum (Willd.) Michx. WHITE PRAIRIE CLOVER. Tucker 8608.
- Psoralea psoralioides var. eglandulosa (Ell.) Freeman. SAMPSON'S SNAKEROOT. Tucker 9513.
- Rhynchosia latifolia Nutt. SNOUTBEAN. Tucker 9856.
- * Robinia pseudo-acacia L. BLACK LOCUST. Tucker 8597.
- Schrankia uncinata Willd. SENSITIVE BRIER. Tucker 9985.
- Stylosanthes biflora (L.) BSP. PENCIL FLOWER. Tucker 8318.

Tephrosia virginiana (L.) Pers. GOAT'S RUE. Tucker 9953.

* Trifolium agrarium L. YELLOW CLOVER. Ross 53.

Trifolium dubium Sibth. LITTLE HOP CLOVER. Whiting 43.

Trifolium incarnatum L. CRIMSON CLOVER. Williamson s.n.

Vicia angustifolia (L.) Reichard. VETCH. Guise 53.

Vicia caroliniana Walt. VETCH. Spivey s.n.

Vicia dasycarpa Ten. VETCH. Williamson 33.

GERANIACEAE

* Geranium carolinianum L. CRANESBILL. Tucker 10193.

* Geranium maculatum L. WILD GERANIUM. Tucker 7062.

OXALIDACEAE

* Oxalis stricta (L.) Small. WOOD SORREL. Tucker 10178.

LINACEAE

Linum medium var. texanum (Planch.) Fern. SUCKER FLAX. Tucker 8607.

RUTACEAE

Ptelea trifoliata L. WAFER ASH. Tucker 7060.

POLYGALACEAE

Polygala sanguinea L. PURPLE MILKWORT. Tucker 5168.

Polygala verticillata var. ambigua (Nutt.) Wood. MILKWORT. Tucker 10192.

EUPHORBIACEAE

Acalypha virginica L. THREE-SEEDED MERCURY. Tucker 5123.

Andrachne phyllanthoides (Nutt.) Coult. MAIDENBUSH. Tucker 9913.

Croton monanthogynus Michx. CROTON. Tucker 10131.

Crotonopsis elliptica Willd. CROTONOPSIS. Tucker 10135.

Euphorbia corollata L. FLOWERING SPURGE. Gossage 18.

Euphorbia maculata L. SPOTTED SPURGE. Tucker 10195.

Phyllanthus caroliniensis Walt. LEAF-FLOWER. Pyle 591 (ARK).

CALLITRICHACEAE

Callitriche terrestris Raf. WATER STARWORT. Pyle 753 (ARK).

ANACARDIACEAE

* Rhus aromatica Ait. AROMATIC SUMAC. Tucker 9058.

* Rhus copallina L. WINGED SUMAC. Tucker 9858.

* Rhus glabra L. SMOOTH SUMAC. Tucker 8612.

* Rhus radicans L. POISON IVY. Tucker 8834.

AQUIFOLIACEAE

✓ Ilex decidua Walt. POSSUM-HAW. Tucker 8784.

CELASTRACEAE

✓ Euonymus atropurpureus Jacq. WAHOO. Tucker 9082.

ACERACEAE

* Acer rubrum L. RED MAPLE. Tucker 8863.

Acer saccharinum L. SILVER MAPLE. Tucker 8862.

* Acer saccharum Marsh. SUGAR MAPLE. Tucker 8616.

STAPHYLEACEAE

✓ Staphylea trifolia L. BLADDERNUT. Tucker 8858.

HIPPOCASTANACEAE

* Aesculus glabra Willd. OHIO BUCKEYE. Tucker 9084.

✓ Aesculus pavia L. RED BUCKEYE. Tucker 8836.

BALSAMINACEAE

Impatiens capensis Meerb. JEWELWEED. Tucker 10127.

RHAMNACEAE

Berchemia scandens (Hill) K. Koch. RATTAN. Tucker 9972.

Ceanothus americanus var. pitcheri T. & G. NEW JERSEY TEA. Tucker 9874.

VITACEAE

* Parthenocissus quinquefolia (L.) Planch. VIRGINIA CREEPER. Tucker 10139.

* Vitis aestivalis Michx. SUMMER GRAPE. Tucker 7070.

> Vitis linsecomii var. glauca Munson. WILD GRAPE. Demaree 23181.

* Vitis rotundifolia Michx. MUSCADINE. Tucker 9962.

* Vitis vulpina L. WINTER GRAPE. Tucker 9534.

TILIACEAE

✓ Tilia floridana Small. BASSWOOD. Tucker 10022.

MALVACEAE

Callirhoe papaver var. bushii (Fern.) Waterfall. POPPY MALLOW.
Pyle 518 (ARK).

HYPERICACEAE

Ascyrum hypericoides L. ST. ANDREW'S CROSS. Tucker 8642.

Ascyrum hypericoides var. multicaule (Michx.) Fern. ST. ANDREW'S CROSS.
Tucker 8649.

Hypericum gentianoides (L.) BSP. PINWEED. Tucker 8651 A.

Hypericum mutilum L. ST. JOHN'S WORT. Tucker 8656.

Hypericum pseudomaculatum L. ST. JOHN'S WORT. Tucker 9508.

CISTACEAE

Lechea tenuifolia Michx. PINWEED. Tucker 8651.

VIOLACEAE

Hybanthus concolor (Forster) Spreng. GREEN VIOLET. Tucker 9076.

Viola lovelliana Brainerd. VIOLET. Pyle 829 (ARK).

* Viola pubescens var. pubescens Ait. YELLOW VIOLET. Tucker 9074.

* Viola rafinesquii Greene. WILD PANSY. Tucker & Wheat s.n.

* Viola sagittata Ait. ARROW-LEAVED VIOLET. Tucker 9093.

PASSIFLORACEAE

Passiflora incarnata L. PASSION FLOWER. Tucker 9944 A.

* Passiflora lutea L. YELLOW PASSION FLOWER. Tucker 5173.

CACTACEAE

Opuntia compressa (Salib.) Macbr. PRICKLY PEAR. Tucker 10196.

LYTHRACEAE

Cuphea petiolata (L.) Koehne. WAXWEED. Tucker 6633.

MELASTOMATACEAE

Rhexia interior Penn. MEADOW BEAUTY. Tucker 8303.

ONAGRACEAE

Circaea quadrisulcata (Maxim.) Franch. & Sav. var. canadensis (L.) Hara.
ENCHANTER'S NIGHTSHADE. Moore 480343 (ARK).

Ludwigia alternifolia L. RATTLEBOX. Tucker 9861.

Oenothera biennis L. EVENING PRIMROSE. Tucker 10197.

* Oenothera fruticosa L. EVENING PRIMROSE. Pyle 383 (ARK).

* Oenothera laciniata Hill. EVENING PRIMROSE. Tucker 10303.

Oenothera linifolia Nutt. SUNDROPS. Pyle 360 (ARK).

ARALIACEAE

* Aralia spinosa L. HERCULES CLUB. Tucker 8844.

* Panax quinquefolius L. GINSENG. Gossage 28.

UMBELLIFERAE

- * Chaerophyllum tainturieri Hook. CHERVIL. Tucker 9542.
- Daucus pusillus Michx. AMERICAN CARROT. Pyle 748 (ARK).
- Erigenia bulbosa (Michx.) Nutt. HARBINGER OF SPRING. Tucker 9077.
- Eryngium prostratum Nutt. CREEPING ERYNGO. Tucker 10186.
- Eryngium yuccifolium Michx. RATTLESNAKE MASTER. Tucker 8311.
- Ligusticum canadense (L.) Britt. ANGELICO. Tucker 9859.
- * Osmorhiza longistylis (Torr.) DC. ANISE. Moore 450284 (ARK).
- * Polytaenia nuttallii DC. PRAIRIE PARSLEY. Tucker 7063.
- Ptilimnium nuttallii (DC.) Britt. MOCK BISHOP'S WEED. Tucker 9987.
- Sanicula canadensis L. SNAKEROOT. Tucker 9860.
- Taenidia integerrima (L.) Drude. YELLOW PIMPERNEL. Underhill 74.
- * Thaspium trifoliatum (L.) Gray. MEADOW PARSNIP. Tucker 9488.
- Torilis japonicus (Houtt.) DC. HEDGE PARSLEY. Tucker 9921.
- Zizia aurea (L.) Koch. GOLDEN MEADOW PARSNIP. Tucker 9947.

CORNACEAE

- * Cornus florida L. FLOWERING DOGWOOD. Tucker 8854.
- * Nyssa sylvatica Marsh. BLACK GUM. Tucker 5127.

ERICACEAE

- * Vaccinium stamineum L. SQUAW-HUCKLEBERRY. Tucker 7066.
- * Vaccinium vacillans Kalm. HUCKLEBERRY. Tucker 10304.

PRIMULACEAE

- Anagallis arvensis L. SCARLET PIMPERNEL. Pyle 698 (ARK).
- Centunculus minimus L. CHAFFWEED. Pyle s.n. (ARK).
- * Dodecatheon meadia L. SHOOTING STAR. Tucker 7067.

Lysimachia ciliata L. LOOSESTRIFE. Tucker 8606.

SAPOTACEAE

Bumelia lanuginosa (Michx.) Pers. GUM BUMELIA. Tucker 9961.

EBENACEAE

* Diospyros virginiana L. PERSIMMON. Tucker 10305.

OLEACEAE

* Chionanthus virginica L. FRINGE TREE. Tucker 8603.

Fraxinus americana L. WHITE ASH. Tucker 9089.

* Ligustrum sinense Lour. CHINESE PRIVET. Tucker 9521.

GENTIANACEAE

Gentiana flavida Raf. YELLOW GENTIAN. Tucker 8339.

Gentiana saponaria L. BOTTLE GENTIAN. Tucker 6625.

Sabatia angularis (L.) Pursh. ROSE PINK. Tucker 8643.

APOCYNACEAE

* Amsonia tabernaemontana Walt. AMSONIA. Tucker 7064.

Apocynum androsaemifolium L. DOGBANE. Palmer 23248 (ARK).

Apocynum cannabinum L. INDIAN HEMP. Tucker 8645.

ASCLEPIADACEAE

* Asclepias amplexicaulis Sm. MILKWEED. McKoy s.n.

* Asclepias quadrifolia Jacq. FOUR-LEAVED MILKWEED. Pyle 326 (ARK).

Asclepias tuberosa L. BUTTERFLY WEED. Tucker 8320.

Asclepias variegata L. WHITE-FLOWERED MILKWEED. Tucker 5182.

* Asclepias verticillata L. MILKWEED. Tucker 5178.

CONVOLVULACEAE

Cuscuta cuspidata Engelm. DODDER. Tucker 8293.

Cuscuta pentagona Engelm. DODDER. Tucker 5172.

POLEMONIACEAE

* Phlox pilosa L. PHLOX. Tucker 5153.

Phlox pilosa var. ozarkana (Michx.) Wherry. PHLOX. Tucker 10194.

BORAGINACEAE

Lithospermum canescens (Michx.) Lehm. PUCCOON. Tallant 48.

Myosotis virginica L. SCORPION GRASS. Tucker 9539.

PHRYMACEAE

Phryma leptostachya L. DROPSEED. Tucker 10167.

VERBENACEAE

Callicarpa americana L. FRENCH MULBERRY. Tucker 5182.

* Verbena canadensis (L.) Britton. VERBENA. Tucker 9997.

Verbena stricta Vent. VERVAIN. Tucker 9888.

Verbena urticifolia L. WHITE VERVAIN. Tucker 10177.

LABIATAE

Cunila origanoides (L.) Britt. DITTANY. Tucker 10174.

Hedeoma hispida Pursh. PENNYROYAL. Pyle 695 (ARK).

Hedeoma pulegioides (L.) Pers. PENNYROYAL. Tucker 8794.

Mentha spicata L. SPEARMINT. Tucker 10173.

Monarda fistulosa L. WILD BERGAMOT. Tucker 9988.

Monarda russelliana Nutt. WILD BERGAMOT. Tucker & Wilkins s.n.

Nepeta cataria L. CATNIP. Tucker 10175.

Perilla frutescens (L.) Britt. BEEFSTEAK PLANT. Tucker 9795.

* Prunella vulgaris L. SELFHEAL. Tucker 9937.

Pycnanthemum albenscens T. & G. MOUNTAIN MINT. Tucker 9916.

Pycnanthemum tenuifolium Schrad. MOUNTAIN MINT. Tucker 10040.

Salvia azurea var. grandiflora Benth. BLUE SAGE. Tucker 10306.

Satureja glabella (Michx.) Briq. CALAMINT. Tucker 9927.

Scutellaria elliptica Muhl. SKULLCAP. Tucker 8334.

Scutellaria incana Spreng. SKULLCAP. Tucker 8598.

Scutellaria ovata Hill. SKULLCAP. Tucker 10006.

Scutellaria parvula Michx. SKULLCAP. Pyle 363 (ARK).

Stachys nuttallii Shuttlw. HEDGE NETTLE. Palmer 23214 (ARK).

Teucrium canadense L. GERMANDER. Tucker 5105.

SOLANACEAE

Datura stramonium L. JIMSON WEED. Tucker 10171.

Solanum carolinense L. HORSE NETTLE. Tucker 10172.

Solanum nigrum var. virgicanum L. NIGHTSHADE. Tucker 8657.

SCROPHULARIACEAE

Gerardia flava L. FOXGLOVE. Tucker 8611.

Gerardia pedicularia var. pectinata Nutt. FOXGLOVE. TUCKER 8309.

Gerardia virginica L. FOXGLOVE. Tucker 10168.

Gratiola neglecta Torr. HEDGE HYSSOP. Pyle 670 (ARK).

Pedicularis canadensis L. LOUSEWORT. Tucker 7074.

* Penstemon arkansanus Pennell. BEARD TONGUE. Tucker 9511.

* Penstemon digitalis Nutt. BEARD TONGUE. Pyle 348 (ARK).

Penstemon tubiflorus Nutt. BEARD TONGUE. Moore 4332 (ARK).

Scrophularia marilandica L. FIGWORT. Tucker 10169.

Verbascum blattaria L. MOTH MULLEIN. Tucker 10171.

Verbascum thapsus L. MULLEIN. Tucker 10307.

BIGNONIACEAE

Campsis radicans (L.) Britt. TRUMPET VINE. Tucker 8860.

Catalpa speciosa Warder. CATALPA. Tucker 8848.

ACANTHACEAE

Ruellia humilis Nutt. WILD PETUNIA. Tucker 9998.

PLANTAGINACEAE

Plantago aristata Michx. PLANTAIN. Tucker 5177.

Plantago elongata Pursh. LITTLE PLANTAIN. Tucker 5175.

* Plantago lanceolata L. RIBGRASS. Tucker 5108.

Plantago rugellii Dcne. PLANTAIN. Tucker 10166.

RUBIACEAE

Diodea teres Walt. BUTTON WEED. Tucker 8639.

Galium aparine L. CLEAVERS. Gossage 37.

* Galium arkansanum Gray. ARKANSAS BEDSTRAW. Tucker 8785.

Galium circaezans Michx. WILD LIQUORICE. Tucker 10019.

Galium concinnum Torr. & Gray. BEDSTRAW. Pyle 658 (ARK).

Galium pilosum Ait. BEDSTRAW. Tucker 9956.

Houstonia purpurea var. calycosa (Gray) Fosberg. BLUETS. Tucker 10000.

Houstonia pusilla Schoepf. BLUETS. Pyle 217.

CAPRIFOLIACEAE

* Lonicera flava Sims. YELLOW HONEYSUCKLE. Tucker 7071.

Sambucus canadensis L. ELDERBERRY. Tucker 9046.

Symphoricarpos orbiculatus Moench. BUCKBRUSH. Tucker 9990.

- * Triosteum perfoliatum L. HORSE GENTIAN. Tucker 10165.
- > Viburnum rufidulum Raf. BLACK HAW. Tucker 8806.

VALERIANACEAE

- Valerianella longiflora (T. & G.) Walp. CORN SALAD. Moore 410123.
- Valerianella radiata (L.) Dufr. CORN SALAD. Ross 67.

CAMPANULACEAE

- Campanula americana L. AMERICAN BELLFLOWER. Tucker 10308.
- Lobelia cardinalis L. CARDINAL FLOWER. Tucker & Wilkins s.n.
- Lobelia inflata L. INDIAN TOBACCO. Tucker 8658.
- Lobelia puberula Michx. DOWNY LOBELIA. Tucker 8299.
- Lobelia spicata Lam. LOBELIA. Tucker 8588.

COMPOSITAE

- Ambrosia artemisiifolia L. LITTLE RAGWEED. Tucker 10316.
- Ambrosia bidentata Michx. RAGWEED. Tucker 8313.
- Ambrosia trifida L. GIANT RAGWEED. Tucker 8815.
- * Antennaria plantaginifolia (L.) Hook. PUSSY TOES. Tucker 10160.
- Arctium minus (Hill.) Bernh. BURDOCK. Tucker 10315
- Aster anomalus Engelm. ASTER. Tucker 8800.
- Aster azureus Lindl. ASTER. Palmer 29605 A (ARK).
- Aster dumosus L. ASTER. Pyle 140 (ARK).
- Aster lateriflorus (L.) Britt. ASTER. Palmer 24186 (ARK).
- Aster linariifolius L. NARROW-LEAVED ASTER. Palmer 29628.
- Aster oblongifolius Nutt. ASTER. Pyle 595 (ARK).
- Aster paludosus subsp. hemisphericus (Alex.) Cron. ASTER. Tucker 8327.
- Aster patens Ait. ASTER. Smith 1559 (ARK).

- Aster pilosus Willd. ASTER. Pyle 592 (ARK).
- Aster sagittifolius var. drummondii (Lindl.) Shinn. ASTER.
Tucker 8816.
- Aster turbinellus Lindl. ASTER. Pyle 102 (ARK).
- Astranthium integrifolium (Michx.) Nutt. DAISY. Tucker & Wilkins s.n.
- Boltonia asteroides (L.) L'Her. BOLTONIA. Tucker 9857.
- Brickellia grandiflora (Hook.) Nutt. THOROUGHWORT. Tucker 10163.
- Cacalia atriplicifolia L. INDIAN PLANTAIN. Tucker 10314.
- Cacalia plantaginea (Raf.) Shinn. INDIAN PLANTAIN. Tucker 10054.
- Centaurea maculosa Lam. STAR THISTLE. Tucker 8610.
- Chrysanthemum leucanthemum L. DAISY. Tucker 3751.
- Cirsium altissimum (L.) Spreng. THISTLE. Tucker 8308.
- Cirsium carolinianum (Walt.) Fern. THISTLE. Tucker 10313.
- Coreopsis grandiflora var. harveyana (Gray) Sherff. TICKSEED. Demaree 52630.
- Coreopsis palmata Nutt. TICKSEED. TUCKER 10057.
- Coreopsis tinctoria Nutt. TICKSEED. Tucker 8609.
- Echinacea pallida Nutt. CONEFLOWER. Pyle 246 (ARK).
- * Echinacea purpurea (L.) Moench. PURPLE CONEFLOWER. Tucker 8614.
- Elephantopus carolinianus Raeusch. ELEPHANT'S FOOT. Tucker 8796.
- * Erigeron annuus (L.) Pers. FLEABANE. Tucker 9343.
- Erigeron canadensis L. HORSEWEED. Tucker 10162.
- Erigeron strigosus Muhl. FLEABANE. Tucker 9920.
- Erigeron altissimus L. BONESET. Pyle 552 (ARK).
- Erigeron coelestinus L. WILD AGERATUM. Spivey s.n.
- Eupatorium incarnatum Walt. WILD AGERATUM. Spivey s.n.
- Eupatorium perfoliatum L. PERFOLIATE BONESET. Tucker 9944.
- Eupatorium purpureum L. JOE PYE. Tucker 10309.

Eupatorium rugosum Houtt. THOROUGHWORT. Smith 1557 (ARK).

Eupatorium serotinum Michx. BONESET. Pyle 637 (ARK).

Gnaphalium purpureum L. RABBIT TOBACCO. Tucker 10001.

Helenium amarum (Raf.) Rock. BITTERWEED. Tucker 10312.

Helenium flexuosum Raf. SNEEZEWEED. Tucker 9928.

Helianthus hirsutus Raf. SUNFLOWER. Tucker 8788.

Helianthus tuberosus L. JERUSALEM ARTICHOKE. Tucker 10311.

Heliopsis helianthoides (L.) Sweet. SUNFLOWER. Tucker 9069.

Heterotheca pilosa (Nutt.) Shinn. GOLDEN ASTER. Tucker 9890.

* Hieracium gronovii L. HAWKWEED. Tucker 8310.

Hieracium longipilum Torr. HAWKWEED. Tucker 10310.

Krigia biflora (Walt.) Blake. FALSE DANDELION. Tucker 9491.

* Krigia dandelion (L.) Nutt. FALSE DANDELION. Pyle 333 (ARK).

Krigia oppositifolia Raf. DWARF DANDELION. Pyle 222 (ARK).

Lactuca canadensis L. WILD LETTUCE. Tucker 8612 A.

Lactuca floridana var. villosa (Jack.) Cronq. WILD LETTUCE. Tucker 10126.

Lactuca scariola L. WILD LETTUCE. Tucker 10132.

Liatris aspera Michx. BLAZING STAR. Tucker 8644.

Liatris ligulistylis (Nels.) K. Schum. BLAZING STAR. Pyle 921 (ARK).

Liatris pycnostachya Michx. BLAZING STAR. Tucker 10053.

Liatris squarrosa (L.) Michx. BLAZING STAR. Tucker 5176.

Parthenium integrifolium L. FEVERFEW. Tucker 10156.

Polymnia canadensis L. LEAF CUP. Tucker 10320.

Polymnia uvedalia L. LEAF CUP. Tucker 10317.

Prenanthes alba L. RATTLESNAKE ROOT. Pyle 894 (ARK).

Prenanthes altissima var. cinnamomea Fern. WILD LETTUCE. Tucker 8329.

- Pyrrhopappus carolinianus (Walt.) DC. FALSE DANDELION. Tucker 10001 A.
- Rudbeckia grandiflora (Sweet) DC. BLACK-EYED SUSAN. Moore 520782 (ARK).
- Rudbeckia hirta L. BLACK-EYED SUSAN. Tucker 8593.
- Senecio aureus L. RAGWORT. Pyle 296 (ARK).
- Senecio plattensis Nutt. RAGWORT. Palmer 24813 (ARK).
- Silphium aspernum Hook. SILPHIUM. Tucker 9863.
- Silphium lacinatedum var. robinsonii Perry. SILPHIUM. Tucker 5175.
- Solidago arguta var. strigosa (Small) Steyer. GOLDENROD. Pyle 863 (ARK).
- * Solidago caesia L. GOLDENROD. Tucker 8808.
- Solidago hispida Muhl. GOLDENROD. Tucker 8325.
- Solidago nemoralis Ait. GOLDENROD. Tucker 8307.
- Solidago petiolaris Ait. GOLDENROD. Tucker 8306.
- Solidago radula Nutt. GOLDENROD. Palmer 24179 (ARK).
- Solidago rigida L. GOLDENROD. Pyle 918 (ARK).
- Solidago rugosa Mill. Tucker 8305.
- Solidago ulmifolia Ell. GOLDENROD. Gossage 10.
- Sonchus asper (L.) Hill. SOW THISTLE. Whiting s. n.
- * Taraxacum officinale Weber. DANDELION. Ross 41.
- Verbesina alternifolia (L.) Britt. WINGSTEM. Tucker 10318.
- Verbesina helianthoides Michx. CROWN BEARD. Tucker 8595.
- Vernonia altissima Nutt. IRONWEED. Pyle 679 (ARK).
- Vernonia baldwini Torr. IRONWEED. Tucker 10125.

+ Source: Tucker, 1972

* Species observed during 1991 field studies

Table B.1. Species observed on Mt. Magazine in 1991 that were not recorded by Tucker in 1972.

Taxa	Common Name
BRYOPHYTA <i>Polytrichum ssp.</i>	Mosses
LILIACEAE <i>Allium stellatum</i> <i>Erythronium albidum</i> <i>Erythronium rostratum</i>	Wild Onion White Dog-toothed Violet Yellow Trout Lily
DIOSCOREACEAE <i>Dioscorea quaternata</i>	Yam
IRIDACEAE <i>Sisyrinchium albidum</i>	Blue-eyed Grass
JUGLANDACEAE <i>Carya illinoensis</i> <i>Carya tomentosa</i>	Pecan Mockernut Hickory
CARYOPHYLLACEAE <i>Cerastium nutans</i>	Nodding Chickweed
RANUNCULACEAE <i>Thalictrum thalictroides</i>	Rue Anemone
FUMARIACEAE <i>Corydalis flavula</i>	Pale Corydalis
CRUCIFERAE (BRASSICACEAE) <i>Arabis laevigata</i>	Rock Cress
SAXIFRAGACEAE <i>Heuchera americana</i> <i>Heuchera villosa</i> <i>Saxifraga palmeri</i>	Rock Geranium Alum Root Palmer's Saxifrage
ROSACEAE <i>Crataegus pruinosa</i> <i>Potentilla recta</i> <i>Pyrus malus</i> <i>Prunus persica</i> <i>Rubus flagellaris</i>	Hawthorn Rough-fruited Cinquefoil Apple Peach Dewberry

APPENDIX B: Part II Continued.

Taxa	Common Name
LEGUMINOSAE (FABACEAE) <i>Baptisia sphaerocarpa</i> <i>Vicia sativa</i>	Yellow Wild Indigo Common Vetch
OXALIDACEAE <i>Oxalis violacea</i>	Violet Wood Sorrel
VITACEAE <i>Ampelopsis cordata</i>	False Grape
HYPERICACEAE <i>Hypericum punctatum</i> var. <i>punctatum</i>	St. John's Wort
VIOLACEAE <i>Viola palmata</i> var. <i>palmata</i> <i>Viola pedata</i> <i>Viola pennsylvanica</i>	Wood Violet Bird's Foot Violet Yellow Violet
UMBELLIFERAE <i>Apium graveolens</i> <i>Chaerophyllum procumbens</i>	Celery Parsley
ERICACEAE <i>Vaccinium pallidum</i>	Low-bush Huckleberry
OLEACEAE <i>Ligustrum ovalifolium</i> <i>Syringa vulgaris</i>	Privet Lilac
BORAGINACEAE <i>Myosotis</i> sp.	Forget-me-not
LAMIACEAE (LABIATAE) <i>Lamium amplexicaule</i> <i>Pedicularis canadensis</i>	Henbit Lousewort
SOLANACEAE <i>Physalis pumila</i>	Ground Cherry
SCROPHULARIACEAE <i>Collinsia violacea</i> <i>Veronica arvensis</i>	Violet Collinsia Corn Speedwell
RUBIACEAE <i>Hedyotis caerulea</i> <i>Hedyotis longifolia</i>	Bluet Long-leaved Bluet

APPENDIX B: Part II Continued.

Taxa	Common Name
CAPRIFOLIACEAE <i>Lonicera japonica</i>	Japanese Honeysuckle
CAMPANULACEAE <i>Triodanis perfoliata</i>	Venus Looking Glass
ASTERACEAE (COMPOSITAE) <i>Achillea millefolium</i> <i>Coreopsis lanceolata</i> <i>Senecio tomentosus</i>	Common Milfoil Lance-leaved Coreopsis Woolly Ragwort

APPENDIX C:

Vertebrates

- Part I - Evaluation of Habitat Potential for Vertebrate Community within Areas of Proposed Development
- Part II - Supporting Tables for Affected Environment

APPENDIX C:

Part I - Evaluation of Habitat Potential for Vertebrate Community within Areas of Proposed Development

The quality of vertebrate habitat within each of the areas where development is proposed relates directly to the diversity of the vegetative cover and the potential for that vegetation to provide food and cover for wildlife species. All areas were evaluated utilizing a predetermined transect/station qualitative characterization modified from habitat analysis procedures to better estimate habitat potential. The results of the qualitative assessment are indicated in Table C.1.

The methodology utilized to evaluate each area is detailed below:

- 1) **Number of Transects:** After an initial reconnaissance of each area, the number of transects resulted from a consideration of area uniformity and the relative shape of the area. The number of transects was chosen to ensure all major habitat variations exhibited within each area were evaluated.
- 2) **Interval Between Transects:** This distance was determined by dividing the maximum distance between boundaries by the number of transects to be evaluated. Generally, this was a division of the maximum distance and could be oriented either in north-south or east-west direction.
- 3) **Mean Length of Transect:** The mean of all transect lengths evaluated within a single area (in feet).
- 4) **Mean Number of Stations Per Transect:** Evaluations were conducted at intervals of 20 ft along each transect within a given area. The mean number of stations per transect was a function of the total number of stations divided by the number of transects.
- 5) **Total Number of Stations Evaluated:** The total number of stations evaluated in a given area was determined by the distance of each transect and the number of transects within each area.

At each station (i.e., 20 ft intervals along each transect), visual observations were made and recorded. These observations included:

- Average percent of vegetative ground cover,
- Understory (sub-canopy woody vegetation),
- Canopy cover,
- Animal activity, and
- Any evidence of wildlife utilization.

The evaluation of percent vegetative cover was determined using predetermined cover class groups of 0-10, 11-25, 26-40, 41-50, 51-65, 66-75, 76-90, and 91-100 percent. Values were recorded as the end points for each cover class, i.e., any value falling in the 0-10 percent range was recorded as 10 percent. These cover classes allowed placement into quartiles or, when needed, values in between.

Because only limited actions are proposed at Greenfield and Brown Springs Picnic Areas, a detailed habitat transect evaluation was not conducted. However, general conditions and wildlife activity observed were recorded on numerous occasions. The proposed water line corridor was surveyed with notations on habitat quality and wildlife activity recorded.

Table C.1. Qualitative evaluation of vertebrate habitat diversity in the proposed areas of development of Mt. Magazine (from field observation 1990-1991).

Location	Number of transects	Interval between transects (ft)	Mean length of transect (ft)	Mean No. stations per transect	Total No. stations evaluated	Relative % vegetative ground cover	Relative % understory	% Canopy
Old Lodge Site	18	125 ft	175	8.75	157.5	65.9	30	68
Bear Hollow Lodge Site	6	180	437	22	132	58	36	26
Cameron Bluff Campground	7	100	322	16.1	113	17	32	76
Visitor Information Center	4	200	325	16.25	70	18	47	57
Quarry Campground	7	300	374	19	131	75	31	20
East End Picnic Area	8	100	175	8.75	70	35	60	43
Mossback Ridge	7	170	460	23	161	65	46	48

APPENDIX C: Part II

Table C.2. Birds identified from Mt. Magazine by Arkansas Audubon Society as of 27 June 1991.

Taxa	Common Name
FALCONIFORMES	
<i>Accipiter cooperii</i>	Cooper's Hawk
<i>Accipiter striatus</i>	Sharp-shinned Hawk
<i>Buteo jamaicensis</i>	Red-tailed Hawk
<i>Buteo lineatus</i> *	Red-shouldered Hawk
<i>Buteo platypterus</i>	Broad-winged Hawk
<i>Cathartes aura</i> *	Turkey Vulture
<i>Coragyps atratus</i>	Black Vulture
<i>Falco sparverius</i> *	American Kestrel
GALLIFORMES	
<i>Colinus virginianus</i> *	Northern Bobwhite
<i>Meleagris gallopavo</i> *	Wild Turkey
CUCULIFORMES	
<i>Coccyzus americanus</i> *	Yellow-billed Cuckoo
<i>Geococcyx californianus</i> *	Greater Roadrunner
STRIGIFORMES	
<i>Bubo virginianus</i>	Great Horned Owl
<i>Otus asio</i>	Eastern Screech-owl
<i>Strix varia</i>	Barred Owl
APODIFORMES	
<i>Archilochus colubris</i> *	Ruby-throated Hummingbird
<i>Chaetura pelagica</i>	Chimney Swift
CAPRIMULGIFORMES	
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow
<i>Caprimulgus vociferus</i>	Whip-poor-will

Table C.2. Continued

Taxa	Common Name
PICIFORMES	
<i>Colaptes auratus</i> *	Northern Flicker
<i>Dryocopus pileatus</i>	Pileated Woodpecker
<i>Melanerpes erythrocephalus</i> *	Red-headed Woodpecker
<i>Melanerpes carolinus</i> *	Red-bellied Woodpecker
<i>Picoides pubescens</i> *	Downy Woodpecker
<i>Picoides villosus</i>	Hairy Woodpecker
<i>Sphyrapicus varius</i> *	Yellow-bellied Sapsucker
PASSERIFORMES	
<i>Agelaius phoeniceus</i> *	Red-winged Blackbird
<i>Aimophila ruficeps</i>	Rufous-crowned Sparrow
<i>Bombycilla cedrorum</i>	Cedar Waxwing
<i>Cardinalis cardinalis</i> *	Northern Cardinal
<i>Carduelis pinus</i>	Pine Siskin
<i>Carduelis tristis</i> *	American Goldfinch
<i>Carpodacus purpureus</i>	Purple Finch
<i>Catharus guttatus</i>	Hermit Thrush
<i>Certhia americana</i> *	Brown Creeper
<i>Contopus borealis</i>	Olive-sided Flycatcher
<i>Contopus virens</i> *	Eastern Wood-pewee
<i>Corvus brachyrhynchos</i> *	American Crow
<i>Cyanocitta cristata</i> *	Blue Jay
<i>Dendroica castanea</i>	Bay-breasted Warbler
<i>Dendroica coronata</i>	Yellow-rumped Warbler
<i>Dendroica dominica</i>	Yellow-throated Warbler
<i>Dendroica fusca</i>	Blackburnian Warbler

Table C.2. Continued

Taxa	Common Name
<i>Dendroica magnolia</i>	Magnolia Warbler
<i>Dendroica pennsylvanica</i>	Chestnut-sided Warbler
<i>Dendroica pinus</i> *	Pine Warbler
<i>Dendroica virens</i>	Black-throated Green Warbler
<i>Dumetella carolinensis</i> *	Gray Catbird
<i>Geothlypis trichas</i> *	Common Yellowthroat
<i>Guiraca caerulea</i> *	Blue Grosbeak
<i>Helminthos vermivorus</i>	Worm-eating Warbler
<i>Hylocichla mustelina</i> *	Wood Thrush
<i>Icterus galbula</i>	Northern Oriole
<i>Icterus spurius</i> *	Orchard Oriole
<i>Icteria virens</i> *	Yellow-breasted Chat
<i>Junco hyemalis</i>	Dark-eyed Junco
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Mimus polyglottos</i> *	Northern Mockingbird
<i>Mniotilta varia</i> *	Black-and-white Warbler
<i>Molothrus ater</i>	Brown-headed Cowbird
<i>Myiarchus crinitus</i> *	Great Crested Flycatcher
<i>Oporornis formosus</i>	Kentucky Warbler
<i>Parula americana</i>	Northern Parula
<i>Parus bicolor</i> *	Tufted Titmouse
<i>Parus carolinensis</i> *	Carolina Chickadee
<i>Passerina cyanea</i> *	Indigo Bunting
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak
<i>Pipilo erythrophthalmus</i> *	Rufous-sided Towhee
<i>Piranga rubra</i> *	Summer Tanager

Table C.2. Continued

Taxa	Common Name
<i>Piranga olivacea</i> *	Scarlet Tanager
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher
<i>Regulus calendula</i>	Ruby-crowned Kinglet
<i>Regulus satrapa</i>	Golden-crowned Kinglet
<i>Sayornis phoebe</i> *	Eastern Phoebe
<i>Seiurus aurocapillus</i> *	Ovenbird
<i>Sitta canadensis</i>	White-Breasted Nuthatch
<i>Sialia sialis</i> *	Eastern Bluebird
<i>Sturnus vulgaris</i> *	European Starling
<i>Thryothorus ludovicianus</i> *	Carolina Wren
<i>Toxostoma rufum</i> *	Brown Thrasher
<i>Troglodytes troglodytes</i>	Winter Wren
<i>Turdus migratorius</i> *	American Robin
<i>Tyrannus forficatus</i> *	Scissor-tailed Flycatcher
<i>Tyrannus tyrannus</i> *	Eastern Kingbird
<i>Vireo flavifrons</i>	Yellow-throated Vireo
<i>Vireo griseus</i> *	White-eyed Vireo
<i>Vireo olivaceus</i> *	Red-eyed Vireo
<i>Vireo philadelphicus</i>	Philadelphia Vireo
<i>Vireo solitarius</i>	Solitary Vireo
<i>Vermivora celata</i>	Orange-crowned Warbler
<i>Vermivora peregrina</i>	Tennessee Warbler
<i>Vermivora ruficapilla</i>	Nashville Warbler
<i>Wilsonia canadensis</i>	Canada Warbler
<i>Wilsonia citrina</i>	Hooded Warbler
<i>Wilsonia pusilla</i>	Wilson's Warbler

Table C.2. Continued

Taxa	Common Name
<i>Zonotrichia albicollis</i>	White-throated Sparrow

* Species Identified During Field Activities August 1990 - October 1991

APPENDIX C: Part II

Table C.3. Taxonomic listing of amphibians and reptiles collected from or observed on the plateau of Mt. Magazine.

Taxa	Common Name	Info. Source*	Location
<i>Desmognathus brimleyorum</i>	Ouachita Dusky Salamander	AHS	Springs/Seeps
<i>Eurycea multiplicata multiplicata</i>	Many-ribbed Salamander	AHS	Springs/Seeps
<i>Plethodon glutinosus glutinosus</i>	Slimy Salamander	AHS	Springs/Seeps
<i>Acris crepitans blanchardi</i>	Blanchard's Cricket Frog	AHS	General
<i>Bufo americanus</i>	American Toad	FTN	General
<i>Hyla cinerea</i>	Green Treefrog	FTN	General/Mossback Ridge
<i>Hyla crucifer</i>	Spring Peeper	FTN	Quarry Area/Mossback Ridge/General
<i>Rana catesbeiana</i>	Bullfrog	AHS/FTN	Pond West of East End
<i>Rana sphenoccephala</i>	Southern Leopard Frog	FTN	Ponds/Wet Weather Tribs.
<i>Terrapene carolina triunguis</i>	Three-Toed Box Turtle	AHS/FTN	Quarry Area/Old Lodge Site
<i>Sceloporus undulatus hyacinthinus</i>	Northern Fence Lizard	AHS/FTN	Quarry Area
<i>Cnemidophorus sexlineatus sexlineatus</i>	Six-lined Racerunner	AHS	General/Rim Trail
<i>Eumeces fasciatus</i>	Five-lined Skink	AHS/FTN	Old Lodge Site
<i>Eumeces laticeps</i>	Broad-headed Skink	AHS/FTN	Old Lodge Site/Rim Trail
<i>Scincella lateralis</i>	Ground Skink	AHS/FTN	General
<i>Agkistrodon contortrix contortrix</i>	Southern Copperhead	AHS/FTN	Old Lodge Site/Mossback Ridge

Table C.3. Continued.

Taxa	Common Name	Info. Source*	Location
<i>Carphophis amoenus</i>	Worm Snake	FTN	Old Cabin Site
<i>Coluber constrictor priapus</i>	Southern Black Racer	AHS/FTN	Bear Hollow Lodge Site
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake	NHC	Old Cabin Site/General
<i>Diadophis punctatus</i>	Ringneck Snake	AHS/FTN	Old Lodge Site
<i>Heterodon platyrhinos</i>	Eastern Hognose Snake	FTN	Brown Springs/Quarry Area
<i>Lampropeltis getulus holbrooki</i>	Speckled Kingsnake	AHS/FTN	Brown Springs
<i>Lampropeltis triangulum amaura</i>	Louisiana Milk Snake	NHC	General
<i>Opheodrys aestivus</i>	Rough Green Snake	FTN	Old Lodge Site/Quarry Area
<i>Storeria occipitomaculata</i>	Red-bellied Snake	AHS	General

*AHS - Arkansas Herpetological Society (1989)

NHC - Natural Heritage Commission

FTN - FTN Associates, Ltd.

APPENDIX D:

Invertebrates

- Part I - Magazine Mountain Biological Inventory Newsletter
- Part II - Validity of *Stygobromus elatus* (Holsinger 1991)

APPENDIX D: Part I

MAGAZINE MOUNTAIN BIOLOGICAL INVENTORY NEWSLETTER

DEPARTMENT OF ENTOMOLOGY AND APPLIED ECOLOGY
 DELAWARE AGRICULTURAL EXPERIMENT STATION
 NEWARK, DE 19717-1303

VOL. 1, NO. 2

OCTOBER-NOVEMBER, 1991

This is the second issue of the Magazine Mountain Biological Inventory Newsletter. From the letters I have received, Vol. 1, No. 1, containing a list of the vascular plants of Magazine Mountain and some introductory notes, has been well received. Since August (1991) several lists of identified arthropod taxa have been received. These include a list of spiders by Patricia R. Miller, Staphylinidae by Lee Herman, and Cerambycidae by Terry Schiefer. These preliminary lists are given in the current issue of the newsletter.

A Preliminary List of the Spiders
 of Magazine Mountain
 by

Patricia R. Miller
 Department of Biology
 The University of Mississippi
 University, MS 38677

ATYPIDAE

1. *Sphodros rufipes* (Latreille)

AMAUROBIIDAE

2. *Titanoeca americana* Emerton ?

DYSDERIDAE

3. *Ariadna bicolor* (Hentz)

ARANEIDAE

4. *Leucauge venusta* (Walckenaer)

AGELENIDAE

5. *Agelenopsis kastoni* Ch. & Ivie
6. *Cicurina robusta* Simon
7. *Coras* Sp. A

HAHNIIDAE

8. *Neoantistea agilis* (Keyserling)

PISAURIDAE

9. *Dolomedes tenebrosus* Hentz
10. *Pisaurina mira* (Walckenaer)

LYCOSIDAE

11. *Allocosa funerea* (Hentz)
12. *Arctosa virgo* (Chamberlin)
13. *Gladicosa gulosa* (Walckenaer)
14. *Lycosa acompa* Chamberlin
15. *Lycosa hentzi* ?
16. *Lycosa rabida* Walckenaer
17. *Schizocosa avida* (Walckenaer)
18. *Schizocosa bilineata* (Emerton)
19. *Schizocosa duplex* Chamberlin
20. *Schizocosa saltatrix* (Hentz)
21. *Schizocosa stridulans* sp. nov. ?
22. *Schizocosa* sp. (*ocrea* sp. group)
23. *Trochosa avara* Keyserling

GNAPHOSIDAE

24. *Callilepis imbecilla* (Keyserling)
25. *Cesonia bilineata* (Hentz)
26. *Drassodes auriculoides* Barrows
27. *Drassodes gosiutus* Chamberlin
28. *Drassyllus aprilinus* (Banks)
29. *Drassyllus covensis* Exline
30. *Drassyllus dromeus* Chamberlin
31. *Drassyllus novus* (Banks)
32. *Rachodrassus echinus* Chamberlin
33. *Rachodrassus exlineae* Pl. & Sh.
34. *Sosticus insularis* (Banks)
35. *Sergiolus capulatus* (Walckenaer)
36. *Sergiolus ocellatus* (Walckenaer)
37. *Zelotes duplex* Chamberlin
38. *Zelotes hentzi* Barrows

CLUBIONIDAE

39. *Castianeira cingulata* (C.L. Koch)
40. *Castianeira longipalpus* (Hentz)
41. *Castianeira crocata*/descripta ?
42. *Castianeira trilineata* (Hentz)
43. *Clubiona kastoni* Gertsch
44. *Clubionoides excepta* (L. Koch)

XANTHOLININAE

62. Diochus schaumii Kraatz
63. Hypnogyra micans ? Casey
64. Neohypnus emmesus Gravenhorst

TACHYPORINAE

65. Bryoporus rufescens LeConte
66. Coproporus ventriculus Say
67. Derops divalis Sanderson
68. Lordithon cinctus Gravenhorst
69. Lordithon facilis Casey
70. Mycetoporus sp. A
71. Mycetoporus sp. B
72. Mycetoporus sp. C
73. Mycetoporus sp. D
74. Sepedophilus basalis Erichson
75. Sepedophilus beckeri Campbell
76. Sepedophilus brachypterus Campbell
77. Sepedophilus cinctulus Erickson
78. Sepedophilus near beckeri Campbell
79. Sepedophilus opicus Say
80. Sepedophilus scriptus Horn
81. Sepedophilus versicolor Casey
82. Tachinus axillaris Erichson
83. Tachinus fimbriatus Gravenhorst
84. Tachinus scrutator Gemminger and Harold
85. Tachinus stacesmithi Campbell
86. Tachyporus locusus Say
87. Tachyporus nitidulus Fabricius

ALEOCHARINAE

88. Deinopsis sp.
89. Gyrophaena A
90. Gyrophaena B
91. Myllaena sp.
92. Myrmecocephalus cingulatus LeConte
93. Myrmecocephalus gracilis Casey
94. Phanerota dissimilis Erichson
95. Phanerota fasciatus Say

The remaining aleocharines were sorted as 26 species but are unidentified even to genus.

Total: 121 species of Staphylinidae

A Preliminary List of the
Cerambycidae of
Magazine Mountain
by

Terry Schiefer
Department of Entomology
P.O. Drawer EM
Mississippi State, MS 39762

The following is a list of 59 species of cerambycids that have been collected on Mt. Magazine, Arkansas. An additional 12 species have been collected in surrounding areas of Logan County and are marked with an asterisk (*). Taxonomy and species sequence follow Chemsak and Linsley (1982) as amended by Linsley and Chemsak (1984) and Skiles (1985). Collections examined include those at University of Arkansas, Mississippi Entomological Museum at Mississippi State University and a portion of the collection at Louisiana State University. This list probably represents less than half the actual cerambycid fauna present in Mt. Magazine.

SUBFAMILY PRIONINAE

Orthosoma brunneum (Forster)
Prionus (Neopolyarthron) imbricornis
(Linnaeus)

SUBFAMILY ASEMINAE

* Arhopalus rusticus obsoletus (Randall)

SUBFAMILY CERAMBYCINAE

Oeme rigida rigida (Say)
Hesperophanes pubescens (Haldeman)
Eburia quadrigeminata (Say)

Specimens from Mt. Magazine have the eburneous elytral ridges somewhat reduced thus resembling E. haldemani LeConte.

Psyrassa unicolor (Randall)
Stenosphenus notatus (Olivier)
Enaphalodes atomarius (Drury)
Enaphalodes cortiphagus (Craighead)
Enaphalodes rufulus (Haldeman)
Anelaphus parallelus (Newman)
Anelaphus pemilis (Newman)

Mecas (Mecas) marginella LeConte

DISTENIIDAE

Distenia undata (Fabricius)

LITERATURE CITED

Chemsak, J.A., and E.G. Linsley. 1982.
Checklist of the Cerambycidae and
Disteniidae of North America,
Central America, and the West Indies
(Coleoptera). Plexus Publishing,
Medford, NJ. 138 pp.

Hopping, R. 1937. The Leturini of
America North of Mexico: Part II.
Nat. Mus. Can. Bull. 85: 1-42.

Linsley, E.G., and J.A. Chemsak. 1984.
The Cerambycidae of North America,
Part VII, No. 1: Taxonomy and
Classification of the Subfamily
Lamiinae, Tribes Parmenini through
Acanthoderini. Univ. Calif. Publ.
Ent. 102: 1-258.

Skiles, D.D. 1985. New genera and
species of Elaphidionine
Cerambycidae (Coleoptera) from North
America and the West Indies.
Coleopts. Bull. 39: 305-320.

College of Sciences
Department of Biological Sciences
Norfolk, Virginia 23529-0266
804-683-3595

APPENDIX D: Part II

11 April 1991

RECEIVED
APR 15 1991U.S. Service
JACKSON, MS

Paul Hartfield
Endangered Species Office
6578 Dogwood View Parkway
Jackson, MS 39213

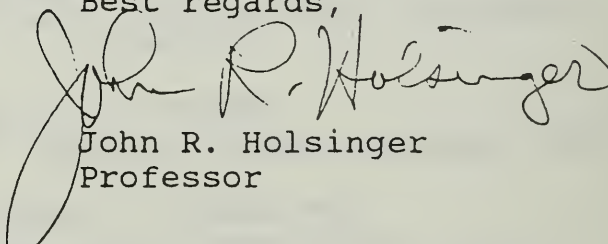
Dear Paul:

I have examined the collections of amphipods you sent from springs and spring-seeps on Magazine Mountain, Arkansas. All are Stygobromus alabamensis (s. lat.) (Stout). All specimens fit my (1967) redescription of the species very closely. However, it is good to see additional material from new sites on Magazine Mountain.

Based primarily on your material, I am no longer at all sure about the validity of Stygobromus elatus, which, as you know, I described from the seep 0.2 mi. E of the Lodge on Magazine Mtn. in the 1967 monograph. It is possible that those particular specimens I based the description on were sexually immature (males) and/or aberrant female members of S. alabamensis. In a forthcoming revision of central USA Stygobromus, I may need to synonymize S. elatus with S. alabamensis. I have never been very comfortable with this species anyway.

In the meantime, thanks for the specimens and for your help in filling in gaps. I hope these determinations will be useful.

Best regards,


John R. Holsinger
Professor

APPENDIX E:

Socioeconomics

- Part I - Supporting Tables for Affected Environment
- Part II - Description of Economic Impact Models
- Part III - Estimation of Park Revenue and Profit

APPENDIX E: Part I

Table E-1. Logan County Population Projections for the Years 1980-2000.

Age Group	1980	Percent	1990*	Percent	2000*	Percent
0-4	1,389	6.9	1,338	6.5	1,171	5.8
5-9	1,536	7.6	1,292	6.3	1,285	6.3
10-14	1,725	8.6	1,484	7.2	1,370	6.7
15-19	2,010	10.0	1,560	7.6	1,256	6.2
20-24	1,310	6.5	1,551	7.5	1,278	6.3
25-29	1,269	6.3	1,842	8.9	1,370	6.7
30-34	1,310	6.5	1,355	6.6	1,535	7.5
35-39	1,130	5.6	1,377	6.7	1,913	9.4
40-44	1,013	5.0	1,392	6.8	1,382	6.8
45-49	920	4.6	1,165	5.7	1,364	6.7
50-54	963	4.8	1,023	5.0	1,354	6.7
55-59	1,077	5.3	908	4.4	1,110	5.4
60-64	1,061	5.2	908	4.4	935	4.6
65-69	1,154	5.7	933	4.5	761	3.7
70-74	963	4.8	817	4.0	681	3.3
75-79	660	3.3	773	3.8	613	3.0
80-84	345	1.7	528	2.6	447	2.2
85+	309	1.5	394	2.0	533	2.6
TOTAL	20,144	100	20,640	100	20,358	100
Median Age	33.2		34.6		37.4	
19 & under	6,660	33.1	5,674	27.5	5,082	25.0
20-64	10,053	49.9	10,613	51.5	12,241	60.1
65 & over	3,431	17.0	3,445	16.7	3,035	14.9

*Projected

Source: U.S. Department of Commerce, Bureau of Census, Census of Population, Various Issues.

APPENDIX E: Part I

Table E-2. Yell County Population Projections for the Years 1980-2000.

Age Group	1980	Percent	1990*	Percent	2000*	Percent
0-4	1,089	6.4	1,170	6.3	1,128	5.7
5-9	1,335	7.8	1,125	6.1	1,211	6.1
10-14	1,297	7.6	1,186	6.4	1,256	6.3
15-19	1,514	8.9	1,411	7.6	1,171	5.9
20-24	1,151	6.8	1,255	6.7	1,132	5.7
25-29	1,102	6.5	1,467	7.9	1,345	6.7
30-34	1,087	6.4	1,218	6.5	1,307	6.5
35-39	1,006	5.9	1,230	6.6	1,619	6.1
40-44	891	5.2	1,230	6.6	1,358	6.8
45-49	879	5.2	1,129	6.1	1,368	6.9
50-54	852	5.0	981	5.3	1,337	6.7
55-59	961	5.6	941	5.1	1,197	6.0
60-64	1,003	6.0	888	4.8	1,015	5.1
65-69	946	5.6	926	5.0	961	4.5
70-74	784	4.6	857	4.6	758	3.8
75-79	541	3.2	711	3.8	704	3.5
80-84	327	1.9	490	2.6	557	2.8
85+	263	1.5	397	2.1	599	3.0
TOTAL	17,026	100	18,618	100	19,963	100
Median Age	34.7		36.9		39.4	
19 & under	5,235	30.7	4,892	26.3	4,766	23.9
20-64	8,932	52.5	10,345	55.6	11,678	58.5
65 & over	2,861	16.8	3,381	18.2	3,519	17.6

*Projected

Source: U.S. Department of Commerce, Bureau of Census, Census of Population, Various Issues.

APPENDIX E: Part I

Table E-3. Johnson County Population Projections for the Years 1980-2000.

Age Group	1980	Percent	1990*	Percent	2000*	Percent
0-4	1,246	7.2	1,159	6.3	1,079	5.9
5-9	1,311	7.5	1,144	6.2	1,142	6.2
10-14	1,327	7.8	1,334	7.2	1,169	6.4
15-19	1,501	8.6	1,482	8.1	1,241	6.6
20-24	1,372	7.9	1,427	7.8	1,358	7.4
25-29	1,087	6.2	1,386	7.5	1,278	7.0
30-34	1,160	6.7	1,325	7.2	1,296	7.1
35-39	958	5.5	1,160	6.3	1,392	7.6
40-44	833	3.6	1,225	6.7	1,321	7.2
45-49	823	3.7	1,003	5.5	1,146	6.2
50-54	897	5.1	871	4.7	1,211	6.6
55-59	946	5.4	853	4.6	985	5.4
60-64	956	5.5	893	4.8	823	4.5
65-69	984	5.6	850	4.6	729	4.5
70-74	812	4.7	760	4.1	675	3.7
75-79	613	3.5	685	3.7	568	3.1
80-84	319	1.8	464	2.5	436	2.4
85+	278	1.6	381	2.1	496	2.7
TOTAL	17,423	100	18,402	100	18,345	100
Median Age	33.7		34.8		37.2	
19 & under	5,385	30.9	5,119	27.8	4,631	25.2
20-64	9,032	51.8	10,143	55.1	10,810	58.9
65 & over	3,006	17.3	3,140	17.1	2,904	15.8

*Projected

Source: U.S. Department of Commerce, Bureau of Census, Census of Population, Various Issues.

APPENDIX E: Part I

Table E-4. Franklin County Population Projections for the Years 1980-2000.

Age Group	1980	Percent	1990*	Percent	2000*	Percent
0-4	1,009	6.9	1,014	6.4	937	5.8
5-9	1,155	7.9	1,001	6.3	1,031	6.3
10-14	1,181	2.0	1,137	7.2	1,085	6.7
45-49	1,476	4.9	1,244	4.9	1,022	6.3
20-24	1,056	7.2	1,132	7.1	1,035	6.3
25-29	989	6.7	1,377	8.7	1,108	6.8
30-34	978	6.7	1,120	7.1	1,140	7.0
35-39	856	5.8	1,118	7.5	1,480	9.1
40-44	753	5.8	1,065	6.7	1,160	7.1
45-49	729	5.3	905	5.7	1,126	6.9
50-54	715	4.9	781	4.9	1,054	6.8
55-59	715	4.9	740	4.7	879	5.4
60-64	739	5.0	708	4.5	742	4.6
65-69	779	5.3	655	4.1	651	3.8
70-74	612	4.2	599	3.8	550	3.4
75-79	456	3.1	557	3.5	453	2.8
80-84	263	1.8	364	2.3	355	2.2
85+	244	8.7	319	2.0	431	2.7
TOTAL	14,705	100	15,836	100	16,239	100
Median Age	32.5		34.5		37.6	
19 & under	4,821	32.8	4,396	27.8	4,075	25.1
20-64	7,530	51.2	8,946	56.5	9,724	59.9
65 & over	2,354	16.0	2,494	15.7	2,440	15.0

*Projected

Source: U.S. Department of Commerce, Bureau of Census, Census of Population, Various Issues.

APPENDIX E: Part I

Table E-5. Scott County population projections for the years 1980-2000.

Age Group	1980	Percent	1990*	Percent	2000*	Percent
0-4	611	6.3	692	6.5	649	5.7
5-9	723	7.5	671	6.3	731	6.4
10-14	811	5.4	714	6.7	777	6.8
15-19	949	9.8	772	7.2	686	6.0
20-24	563	5.3	737	6.9	623	5.5
25-29	547	5.6	875	8.2	683	6.0
30-34	586	6.1	615	5.7	771	6.8
35-39	626	6.0	642	6.0	985	8.7
40-44	567	5.4	670	6.3	674	5.9
45-49	508	5.2	714	6.0	702	6.2
50-54	532	5.5	644	6.0	733	6.4
55-59	526	5.4	563	5.3	760	8.7
60-64	518	5.3	561	5.2	657	5.9
65-69	551	5.7	504	4.7	522	4.6
70-74	461	4.8	445	4.2	465	4.1
75-79	316	3.8	410	3.8	365	3.2
80-84	149	1.5	279	2.6	276	2.4
85+	141	1.5	204	1.9	311	2.7
TOTAL	9,685	100	10,708	100	11,370	100
Median Age	35.4		37.2		38.9	
19 & under	3,094	31.9	2,849	26.6	2,843	25.0
20-64	4,973	51.3	6,017	56.2	6,588	58.0
65 & over	1,618	16.7	1,842	17.2	1,939	17.0

*Projected

Source: U.S. Department of Commerce, Bureau of Census, Census of Population, Various Issues.

Table E-6. Logan County personal income by place of residence.

Personal Income (Dollars)	1984	1985	1986	1987	1986	1989
Total Personal Income (thousands of dollars)	186,732	195,911	208,977	216,447	231,087	252,772
Nonfarm Personal Income (thousands of dollars)	173,476	182,634	190,865	199,498	214,685	230,771
Farm Income ¹ (thousands of dollars)	13,256	13,277	18,112	16,949	16,402	22,001
Population ² (hundreds)	206	208	208	208	207	206
Per Capita Personal Income (Dollars)	9,047	9,403	10,050	10,412	11,161	12,247
Derivation of Total Personal Income						
Earnings by Place of Work (thousands of dollars)	88,778	94,424	106,226	110,070	121,317	134,510
Less: Personal Cont. for Social Ins. ³ (thousands of dollars)	4,912	5,560	6,411	6,795	8,057	9,918
Plus: Adjustment for Residence ⁴ (thousands of dollars)	24,573	23,458	23,237	25,787	25,980	25,225
Equals: Net Earnings by Place of Residence (thousands of dollars)	108,439	112,322	123,052	129,062	139,062	150,537
Plus: Dividends, Interest, and Rent ⁵ (thousands of dollars)	29,028	30,835	30,093	30,078	32,783	37,666
Plus: Transfer Payments (thousands of dollars)	39,265	52,754	55,832	56,677	59,064	64,569

¹Farm income consists of proprietors' net farm income, the wages of hired farm labor, the pay-in-kind of hired farm labor, and the salaries of officers of corporate farms.

²Midyear population estimates of the Bureau of the Census, estimates for 1986-88 reflect revisions available as of Sept. 1989. In some instances, estimates prior to 1986 are not consistent with those for 1986-88. BEA prepared 1989 county population estimates based on the Census Bureau 1989 state estimates and on the 1986-88 trend in the Census Bureau County estimates.

³Personal contributions for social insurance are included in earnings by type and industry but excluded from personal income.

⁴U.S. adjustment for residence consists of adjustments for border workers: income of U.S. residents commuting outside U.S. borders to work less income of foreign residents commuting inside U.S. borders to work plus certain Caribbean seasonal workers.

⁵Includes the capital consumption adjustment for rental income of person.

Table E-7. Yell County personal income by place of residence.

Personal Income (Dollars)	1984	1985	1986	1987	1988	1989
Nonfarm Personal Income(thousands of dollars)	141,690	151,374	161,250	165,945	174,230	184,402
Farm Income ¹ (thousands of dollars)	14,993	18,796	29,250	22,745	21,352	28,589
Population ² (hundreds)	175	178	178	178	182	184
Per Capita Personal Income (Dollars)	8,955	9,672	10,709	10,516	10,759	11,602
Derivation of Total Personal Income						
Earnings by Place of Work (thousands of dollars)	95,877	104,760	125,343	122,601	126,276	135,987
Less: Personal Cont. for Social Insurance ³ (thousands of dollars)	5,202	5,897	7,077	7,424	8,167	8,859
Plus: Adjustment for Residence ⁴ (thousands of dollars)	6,389	5,849	3,902	5,169	5,808	6,453
Equals: Net Earnings by Place of Residence (thousands of dollars)	97,064	104,712	122,168	120,346	123,917	133,581
Plus: Dividends, Interest, and Rent ⁵ (thousands of dollars)	3,171	26,601	26,568	25,110	26,862	30,858
Plus: Transfer Payments (thousands of dollars)	36,448	38,857	41,764	43,234	44,803	48,552

¹Farm income consists of proprietors' net farm income, the wages of hired farm labor, the pay-in-kind of hired farm labor, and the salaries of officers of corporate farms.

²Midyear population estimates of the Bureau of the Census, estimates for 1986-88 reflect revisions available as of Sept. 1989. In some instances, estimates prior to 1986 are not consistent with those for 1986-88. BEA prepared 1989 county population estimates based on the Census Bureau 1989 state estimates and on the 1986-88 trend in the Census Bureau County estimates.

³Personal contributions for social insurance are included in earnings by type and industry but excluded from personal income.

⁴U.S. adjustment for residence consists of adjustments for border workers: income of U.S. residents commuting outside U.S. borders to work less income of foreign residents commuting inside U.S. borders to work plus certain Caribbean seasonal workers.

⁵Includes the capital consumption adjustment for rental income of person.

Source: U.S. Department of Commerce, 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

Table E-8. Johnson County personal income by place of residence.

Personal Income (Dollars)	1984	1985	1986	1987	1988	1989
Total Personal Income (thousands of dollars)	155,257	166,349	177,982	176,812	185,071	203,814
Nonfarm Personal Income (thousands of dollars)	145,024	156,209	163,386	163,210	171,328	186,401
Farm Income ¹ (thousands of dollars)	10,233	10,140	14,596	13,602	13,743	17,413
Population ² (hundreds)	184	184	184	185	184	184
Per Capita Personal Income (Dollars)	8,443	9,024	9,571	9,556	10,045	11,076
Derivation of Total Personal Income						
Earnings by Place of Work (thousands of dollars)	87,772	93,789	101,999	99,530	105,677	117,472
Less: Personal con. for Social Insurance ³ (thousands of dollars)	5,099	5,793	6,526	6,413	7,175	8,326
Plus: Adjustment for Residence ⁴ (thousands of dollars)	4,576	5,048	4,642	6,908	6,340	6,246
Equals: Net Earnings by Place of Residence (thousands of dollars)	87,249	93,044	100,115	100,025	104,842	115,392
Plus: Dividends, Interest, and Rent ⁵ (thousands of dollars)	28,320	30,436	31,279	28,328	30,326	34,810
Plus: Transfer Payments (thousands of dollars)	39,688	42,869	46,588	48,459	49,903	53,612

¹Farm income consists of proprietor's net farm income, the wages of hired farm labor, the pay-in-kind of hired farm labor, and the salaries of officers of corporate farms.

²Midyear population estimates of the Bureau of the Census, estimates for 1986-88 reflect revisions available as of Sept. 1989. In some instances, estimates prior to 1986 are not consistent with those for 1986-88. BEA prepared 1989 county population estimates based on the Census Bureau 1989 state estimates and on the 1986-88 trend in the Census Bureau County estimates.

³Personal contributions for social insurance are included in earnings by type and industry but excluded from personal income.

⁴U.S. adjustment for residence consists of adjustments for border workers: income of U.S. residents commuting outside U.S. borders to work less income of foreign residents commuting inside U.S. borders to work plus certain Caribbean seasonal workers.

⁵Includes the capital consumption adjustment for rental income of person.

Table E-9. Franklin County personal income by place of residence.

Personal Income (Dollars)	1984	1985	1986	1987	1988	1989
Total Personal Income (thousands of dollars)	132,880	143,598	156,995	159,021	164,465	179,548
Nonfarm Personal Income (thousands of dollars)	121,487	128,805	136,837	140,329	147,895	156,920
Farm Income ¹ (thousands of dollars)	11,393	14,793	20,158	18,692	16,570	22,628
Population ² (hundreds)	154	155	155	156	157	157
Per Capita Personal Income (Dollars)	8,612	9,277	10,111	10,162	10,488	11,411
Derivation of Total Personal Income						
Earnings by Place of Work (thousands of dollars)	67,363	72,958	80,446	81,316	82,337	93,479
Less: Personal Cont. for Social Insurance ³ (thousands of dollars)	3,628	3,958	4,373	4,590	5,066	5,738
Plus: Adjustment for Residence ⁴ (thousands of dollars)	19,093	19,889	22,731	24,200	26,011	24,032
Equals: Net Earnings by Place of Residence (thousands of dollars)	82,828	88,889	98,804	100,926	103,282	111,773
Plus: Dividends, Interest, and Rent ⁵ (thousands of dollars)	20,002	22,307	23,761	22,463	24,067	27,561
Plus: Transfer Payments (thousands of dollars)	30,050	32,402	34,430	35,632	37,116	40,214

¹Farm income consists of proprietors' net farm income, the wages of hired farm labor, the pay-in-kind of hired farm labor, and the salaries of officers of corporate farms.

²Midyear population estimates of the Bureau of the Census, estimates for 1986-88 reflect revisions available as of Sept. 1989. In some instances, estimates prior to 1986 are not consistent with those for 1986-88. BEA prepared 1989 county population estimates based on the Census Bureau 1989 state estimates and on the 1986-88 trend in the Census Bureau County estimates.

³Personal contributions for social insurance are included in earnings by type and industry but excluded from personal income.

⁴U.S. adjustment for residence consists of adjustments for border workers: income of U.S. residents commuting outside U.S. borders to work less income of foreign residents commuting inside U.S. borders to work plus certain Caribbean seasonal workers.

⁵Includes the capital consumption adjustment for rental income of person.

Source: U.S. Department of Commerce, 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

Table E-10. Scott County personal income by place of residence.

Personal Income (Dollars)	1984	1985	1986	1987	1988	1989
Total Personal Income (thousands of dollars)	87,398	93,938	107,858	107,254	110,361	118,088
Nonfarm Personal Income (thousands of dollars)	72,219	78,737	86,088	87,790	90,433	94,511
Farm Income ¹ (thousands of dollars)	15,179	15,201	21,770	19,464	19,928	23,577
Population ² (hundreds)	99	102	103	105	105	107
Per Capita Personal Income (Dollars)	8,843	9,235	10,474	10,169	10,471	11,083
Derivation of Total Personal Income						
Earnings by Place of Work (thousands of dollars)	50,643	54,738	67,208	65,754	66,553	70,468
Less: Personal Cont. for Social Ins. ³ (thousands of dollars)	2,359	2,786	3,437	3,525	3,743	4,017
Plus: Adjustment for Residence ⁴ (thousands of dollars)	6,203	6,582	7,192	7,816	8,228	7,965
Equals: Net Earnings by Place of Residence (thousands of dollars)	54,487	58,534	70,963	70,045	71,038	74,416
Plus: Dividends, Interest, and Rent ⁵ (thousands of dollars)	13,962	15,418	15,428	14,929	15,936	18,348
Plus: Transfer Payments (thousands of dollars)	18,949	19,986	21,467	22,280	23,387	25,324

¹Farm income consists of proprietors' net farm income, the wages of hired farm labor, the pay-in-kind of hired farm labor, and the salaries of officers of corporate farms.

²Midyear population estimates of the Bureau of the Census, estimates for 1986-88 reflect revisions available as of Sept. 1989. In some instances, estimates prior to 1986 are not consistent with those for 1986-88. BEA prepared 1989 county population estimates based on the Census Bureau 1989 state estimates and on the 1986-88 trend in the Census Bureau County estimates.

³Personal contributions for social insurance are included in earnings by type and industry but excluded from personal income.

⁴U.S. adjustment for residence consists of adjustments for border workers: income of U.S. residents commuting outside U.S. borders to work less income of foreign residents commuting inside U.S. borders to work plus certain Caribbean seasonal workers.

⁵Includes the capital consumption adjustment for rental income of person.

Source:

U.S. Department of Commerce, 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

APPENDIX E: Part I

Table E-11. Logan County personal income by major source industry.

Personal Income (Thousands of Dollars)	1984	1985	1986	1987	1988	1989
Earnings by Type:						
Wages and Salaries	55,301	58,886	63,844	65,837	74,528	79,888
Other Labor Income	5,855	5,998	6,556	7,145	8,326	9,401
Proprietors' Income ¹	27,622	29,540	35,826	37,088	38,463	45,221
Farm	12,474	12,514	17,363	16,168	15,625	21,224
Nonfarm	15,148	17,026	18,463	20,920	22,838	23,997
Earnings by Industry:						
Farm	13,256	13,277	18,112	16,949	16,401	22,001
Nonfarm	75,522	81,147	88,114	93,121	104,915	112,509
Private	59,973	64,024	69,672	74,032	84,534	90,876
Ag. Serv., For., Fish., and Other ²	741	679	675	794	795	1,126
Mining	1,180	1,048	799	572	557	343
Construction	5,069	6,102	6,483	5,221	6,477	7,036
Manufacturing	22,518	22,278	25,603	29,482	35,818	39,719
Nondurable Goods	13,075	11,291	12,889	12,512	14,377	15,370
Durable Goods	9,443	10,987	12,714	16,890	21,441	24,349
Transportation and Public Utilities	2,795	2,737	3,696	4,360	4,308	4,244
Wholesale Trade	3,552	4,035	3,506	3,694	3,672	3,178

Table E-11. Continued.

Earnings by Industry: (continued)	1984	1985	1986	1987	1988	1989
Retail Trade	10,309	10,554	11,258	10,924	12,278	12,351
Finance, Insurance, and Real Estate	2,372	2,611	2,699	2,819	2,860	3,153
Services	11,437	13,980	14,953	16,156	17,769	19,726
Government and Government Enterprises	15,549	17,123	18,442	19,089	20,381	21,633
Federal, Civilian	2,829	3,025	3,108	3,258	3,618	3,740
Military	528	549	611	679	696	711
State and Local	12,192	13,549	14,723	15,152	16,067	17,182

¹Includes the inventory valuation and capital consumption adjustments.²"Other" consists of wages + salaries of U.S. residents employed by Intl. Org. + Foreign Embassies + Consulates in the United States.

Source: U.S. Department of Commerce. 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

Table E-12. Yell County personal income by major source industry.

Personal Income (Thousands of Dollars)	1984	1985	1986	1987	1986	1989
Earnings by Type:						
Wages and Salaries	60,342	64,876	72,058	75,405	78,413	79,815
Other Labor Income	7,081	7,434	8,329	8,838	9,275	9,789
Proprietors' Income ¹	28,454	32,450	44,956	38,358	38,588	46,383
Farm	13,610	17,430	27,895	21,312	19,909	27,121
Nonfarm	14,844	15,020	17,061	17,046	18,679	19,262
Earnings by Industry:						
Farm	14,993	18,796	29,250	22,745	21,352	28,589
Nonfarm	80,884	85,964	96,093	99,856	104,924	107,398
Private	65,809	70,187	79,648	82,585	86,928	88,403
Ag. Serv., For., Fish, and Other ²	590	439	375	496	565	756
Mining	358	1,114	357	236	278	273
Construction	3,790	5,047	6,808	7,508	7,951	7,158
Manufacturing	34,392	37,804	43,573	43,408	44,359	45,874
Nondurable Goods	29,668	32,775	38,340	37,787	38,232	40,368
Durable Goods	4,724	5,029	5,233	5,621	6,127	5,506
Transportation and Public Utilities	7,357	5,916	7,709	9,254	10,162	9,775
Wholesale Trade	1,677	1,771	1,560	1,807	2,111	2,245
Retail Trade	6,159	6,268	6,439	6,703	7,336	7,604

Table E-12. Continued.

Earnings by Industry: (continued)	1984	1985	1986	1987	1988	1989
Finance, Insurance, and Real Estate	2,345	2,456	2,675	3,058	3,114	3,083
Services	9,141	9,372	10,153	10,115	11,052	11,635
Government and Government Enterprises	15,075	15,777	16,445	17,271	17,996	18,995
Federal, Civilian	4,478	4,569	4,365	4,410	4,701	5,040
Military	425	466	518	581	611	633
State and Local	10,172	10,742	11,562	12,280	12,684	13,322

¹Includes the inventory valuation and capital consumption adjustments.

²"Other" consists of wages + salaries of U.S. residents employed by Intl. Org. + Foreign Embassies + Consulates in the United States.

Source: U.S. Department of Commerce. 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

Table E-13. Johnson County personal income by major source industry.

Personal Income (Thousands of Dollars)	1984	1985	1986	1987	1988	1989
Earnings by Type:						
Wages and Salaries	60,324	63,529	67,770	63,994	67,313	72,784
Other Labor Income	6,909	6,917	7,466	7,061	7,500	8,171
Proprietors' Income ¹	20,539	23,343	26,763	28,475	30,864	36,517
Farm	9,507	9,430	13,896	12,866	13,007	16,670
Nonfarm	11,032	13,913	12,867	15,609	17,857	19,847
Earnings by Industry:						
Farm	10,233	10,140	14,596	13,602	13,743	17,413
Nonfarm	77,539	83,649	87,403	85,928	91,934	100,049
Private	64,857	70,126	72,765	70,342	75,284	82,744
Ag. Service, For., Fish., and Other ²	195	206	171	231	220	245
Mining	-	-	-	-	-	-
Construction	3,892	4,826	4,581	4,156	4,144	4,178
Manufacturing	34,696	34,785	38,241	31,893	34,486	38,282
Nondurable Goods	15,832	16,699	24,088	19,263	19,692	24,277
Durable Goods	18,864	18,086	14,153	12,630	14,794	14,005
Transportation and Public Utilities	1,372	3,018	2,430	5,858	6,929	8,256
Wholesale Trade	917	2,022	2,026	2,572	1,999	2,241
Retail Trade	9,202	9,459	9,482	10,081	10,928	11,504

Table E-13. Continued.

Earnings by Industry: (continued)	1984	1985	1986	1987	1988	1989
Finance, Insurance, and Real Estate	2,511	2,391	2,473	2,869	2,578	2,806
Services	11,492	12,805	13,099	12,578	13,751	14,849
Government and Government Enterprises	12,682	13,523	14,638	15,586	16,650	17,315
Federal, Civilian	2,159	2,043	2,330	2,507	2,742	2,825
Military	447	488	543	598	620	634
State and Local	10,076	10,992	11,765	12,481	13,288	13,856

¹Includes the inventory valuation and capital consumption adjustments.

²"Other" consists of wages + salaries of U.S. residents employed by Intl. Org. + Foreign Embassies + Consulates in the United States.

Source: U.S. Department of Commerce. 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

Table E-14. Franklin County personal income by major source.

Personal Income (Thousands of Dollars)	1984	1985	1986	1987	1988	1989
Earnings by Type:						
Wages and Salaries	44,509	46,043	46,912	48,685	50,914	55,055
Other Labor Income	4,776	4,695	4,716	4,940	5,268	5,820
Proprietors' Income ¹	18,078	22,220	28,818	27,691	26,155	32,604
Farm	9,832	13,246	18,618	17,055	14,914	20,933
Nonfarm	8,246	8,974	10,200	10,636	11,241	11,671
Earnings by Industry:						
Farm	11,393	14,793	20,158	18,692	16,570	22,628
Nonfarm	55,970	58,165	60,288	62,624	65,767	70,851
Private	42,889	43,448	45,255	47,071	49,452	51,979
Ag. Serv., For., Fish., and Other ²	321	320	325	(D)	378	(D)
Mining	291	359	476	(D)	838	(D)
Construction	3,802	4,079	4,074	4,504	4,975	5,100
Manufacturing	15,768	14,475	14,012	14,043	14,637	15,610
Nondurable Goods	8,713	8,029	8,111	8,499	8,864	9,312
Durable Goods	7,055	6,446	5,901	5,544	5,773	6,298
Transportation and Public Utilities	6,216	6,329	6,832	7,883	7,825	8,256
Wholesale Trade	337	413	448	534	490	426
Retail Trade	5,325	5,499	5,520	5,649	6,437	6,814

Table E-14. Continued.

Earnings by Industry: (continued)	1984	1985	1986	1987	1988	1989
Finance, Insurance, and Real Estate	2,013	2,062	2,151	2,550	2,422	2,633
Services	8,816	9,912	11,417	10,957	11,450	12,010
Government and Government Enterprises	13,081	14,717	15,033	15,553	16,315	18,872
Federal, Civilian	3,838	4,261	4,038	4,120	4,267	4,734
Military	1,043	1,290	1,347	1,313	1,346	1,937
State and Local	8,200	9,166	9,648	10,120	10,702	12,201

¹Includes the inventory valuation and capital consumption adjustments.²"Other" consists of wages + salaries of U.S. residents employed by Intl. Org. + Foreign Embassies + Consulates in the United States.

Source: U.S. Department of Commerce. 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

Table E-15. Scott County personal income by major source industry.

Personal Income (Thousands of Dollars)	1984	1985	1986	1987	1988	1989
Earnings by Type:						
Wages and Salaries	26,394	29,585	34,181	34,032	34,106	33,905
Other Labor Income	2,908	3,189	3,746	3,704	3,722	3,786
Proprietors' Income ¹	21,341	21,964	29,281	28,018	28,725	32,777
Farm	14,425	14,449	21,022	18,672	19,128	22,760
Nonfarm	6,916	7,515	8,259	9,346	9,597	10,017
Earnings by Industry:						
Farm	15,179	15,201	21,770	19,464	19,928	23,577
Nonfarm	35,464	39,537	45,438	46,290	46,625	46,891
Private	29,254	32,902	38,466	39,050	39,095	38,930
Ag. Serv., For., Fish., and Other ²	820	785	988	1,134	1,114	1,119
Mining	787	239	(D)	(D)	(D)	(D)
Construction	951	1,148	1,306	1,422	1,284	1,253
Manufacturing	13,797	16,345	20,466	19,233	18,446	17,504
Nondurable Goods	9,700	12,038	16,052	13,981	13,792	12,964
Durable Goods	4,097	4,307	4,414	5,252	4,654	4,540
Transportation and Public Utilities	3,370	3,644	4,603	5,658	5,249	5,308
Wholesale Trade	460	563	585	584	665	717
Retail Trade	4,091	4,565	4,465	4,662	5,290	5,357

Table E-15. Continued.

Earnings by Industry: (continued)									
Finance, Insurance, and Real Estate	898	1,151	1,272	1,436	1,488	1,555			
Services	4,080	4,462	4,754	4,893	5,525	6,078			
Government and Government Enterprises	6,210	6,635	6,972	7,240	7,530	7,961			
Federal, Civilian	2,008	2,200	2,200	2,205	2,363	2,468			
Military	240	269	301	342	354	367			
State and Local	3,962	4,166	4,471	4,693	4,813	5,126			

¹Includes the inventory valuation and capital consumption adjustments.

²"Other" consists of wages + salaries of U.S. residents employed by Intl. Org. + Foreign Embassies + Consulates in the United States.

Source: U.S. Department of Commerce. 1984-1989. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

APPENDIX E: Part I

Table E-16. Logan County weekly covered earnings by industry.

Industry	Total Earnings (\$)		Average Weekly Earnings (\$)	
	1985	1990	1985	1990
Manufacturing	19,286,129	35,124,982	269.34	313.88
Nonmanufacturing	32,873,883	39,372,611	278.15	250.14
Construction	2,989,238	1,849,920	304.16	335.62
Transportation and Public Utilities	1,506,203	-	311.46	-
Trade-Wholesale and Retail	8,560,203	9,643,057	195.06	188.27
Finance, Insurance and Real Estate	2,106,112	2,743,265	257.98	308.51
Services	4,194,294	5,500,975	185.00	212.85
State and Local Government	12,454,587	16,811,680	247.68	291.26
Other Nonmanufacturing	1,062,509	2,823,714	240.39	343.68
TOTAL	52,160,012	74,497,593	241.82	276.63

Source: Arkansas Employment Security Division, State of Arkansas.

APPENDIX E: Part I

Table E-17. Yell County average weekly covered earnings by industry.

Industry	Total Earnings (\$)		Average Weekly Earnings (\$)	
	1985	1990	1985	1990
Manufacturing	32,746,466	43,587,987	220.34	274.38
Nonmanufacturing	25,755,085	38,333,232	221.11	265.65
Construction	635,549	1,578,306	190.97	252.93
Transportation and Public Utilities	2,417,483	5,503,610	325.11	440.99
Trade-Wholesale and Retail	4,315,162	5,799,691	155.98	177.32
Finance, Insurance and Real Estate	1,962,899	2,876,811	273.54	400.89
Services	4,117,878	5,206,486	185.89	211.68
State and Local Government	9,856,066	12,912,564	241.76	279.64
Other Nonmanufacturing	2,450,048	4,455,764	241.76	279.64
TOTAL	58,501,551	81,921,219	220.68	270.27

Source: Arkansas Employment Security Division, State of Arkansas.

APPENDIX E: Part I

Table E-18. Johnson County average weekly covered earnings by industry.

Industry	Total Earnings (\$)		Average Weekly Earnings (\$)	
	1985	1990	1985	1990
Manufacturing	30,149,223	36,515,424	249.16	300.99
Nonmanufacturing	29,151,682	38,444,534	223.44	259.50
Construction	-	-	-	-
Transportation and Public Utilities	-	-	-	-
Trade-Wholesale and Retail	7,533,700	9,707,786	170.85	186.88
Finance, Insurance and Real Estate	1,852,788	2,113,475	271.99	322.57
Services	6,454,170	7,878,679	201.82	241.26
State and Local Government	10,170,535	13,520,697	276.25	320.21
Other Nonmanufacturing	3,140,489	5,223,897	290.36	352.49
TOTAL	59,300,905	74,959,958	235.82	278.18

Source: Arkansas Employment Security Division, State of Arkansas.

APPENDIX E: Part I

Table E-19. Franklin County average weekly covered earnings by industry.

Industry	Total Earnings (\$)		Average Weekly Earnings (\$)	
	1985	1990	1985	1990
Manufacturing	12,737,261	13,227,407	253.57	279.22
Nonmanufacturing	25,328,958	34,976,311	241.61	288.18
Construction	1,406,063	1,477,182	250.37	281.26
Transportation and Public Utilities	4,561,323	6,672,805	384.73	430.61
Trade-Wholesale and Retail	4,254,594	5,949,095	155.55	180.45
Finance, Insurance and Real Estate	1,710,576	2,388,699	283.58	358.88
Services	4,492,118	4,964,919	213.30	269.72
State and Local Government	8,326,312	12,432,038	276.54	315.41
Other Nonmanufacturing	578,071	12,091,573	202.12	344.13
TOTAL	38,066,219	48,203,718	245.49	285.67

Source: Arkansas Employment Security Division, State of Arkansas.

APPENDIX E: Part I

Table E-20. Scott County average weekly covered earnings by industry.

Industry	Total Earnings (\$)		Average Weekly Earnings (\$)	
	1985	1990	1985	1990
Manufacturing	14,250,625	-	219.24	-
Nonmanufacturing	12,370,232	-	217.25	-
Construction	-	-	-	-
Transportation and Public Utilities	-	862,980	-	395.14
Trade-Wholesale and Retail	3,215,578	4,359,841	159.79	166.03
Finance, Insurance and Real Estate	-	1,325,190	-	274.03
Services	1,673,455	2,686,041	181.82	223.61
State and Local Government	3,842,055	4,959,820	273.65	299.00
Other Nonmanufacturing	3,639,144	20,298,892	268.14	284.94
TOTAL	26,620,857	34,492,764	218.40	259.11

Source: Arkansas Employment Security Division, State of Arkansas.

APPENDIX E:

Part II - Description of Economic Impact Models

One of the standard methods of determining potential effects of any project is a "regional economic multiplier" approach. These methods are derived from input-output (I/O) models, which assume there is a constant relationship between the values of output for an industry and the values of the inputs purchased in order to provide that output. One of the primary uses of an input-output model is to derive regional impact multipliers. The multiplier analysis is based upon the accepted theory that an increase in initial demand (i.e., initial project construction costs or an inflow of tourists with tourist expenditures) leads to even greater increases in regional incomes and employment. For example, a construction worker who would be hired and paid income for the Mt. Magazine project would in turn spend some portion of this income on goods and services produced in the region. The individuals receiving this income would continue to spend, thereby creating income for others who spend and create additional income for still others. The multiplier process ends when the income is either not spent (taxed or saved) or spent outside the region. What a region must do is provide some goods or services which attract exogenous funds from outside that region. This is called an export base. In our example above, the state would send the construction funds into the area and tourists would provide income to the local area from outside the region. To continue the example--if the regional multiplier is 1.6, it means that the initial inflow of \$1 would create \$1 worth of income for the recipient, and that this in turn would continue in a spending stream until an additional 60 cents of income was generated. Another very important consideration is what is called the employment multiplier, a number which indicates the number of jobs that can be expected to be generated within a region. There is also a multiplier for wages and salaries expected to be generated. It should be noted that multipliers work in reverse, and this explains why the whole region suffers and not just the laid-off plant employees if a primary employer within a region either shuts down or reduces its work force.

In summation, the economic impact of a project or industry such as tourism can be analyzed using regional multipliers based upon input-output models. These multipliers sum up both the direct impact of the initial expenditure as well as the indirect effects of its continuation in the spending stream.

Visitation and Expenditure Estimates

In a separate study prepared by CPS, Inc. of Little Rock for the U.S. Forest Service concerning the economic feasibility of the Mt. Magazine Recreation Site dated 1973, projections were made for the Lodge-Resort development. The 1973 CPS demand analysis study was based upon population projections that are still valid. If anything, they are understated. The transportation system, also part of the CPS demand analysis, is improved. The Midwest Research Institute method of recreational demand was used to estimate visitations. This method uses the recreational demand of population centers and allocates this demand to competitive areas and facilities based upon travel time and distance, type of trip, and relative attractiveness of the facility. It is regarded as superior to other visitation estimating methods. This method yielded a net demand of 182,625

visitations for the year 2000. For comparison purposes, the Queen Wilhelmina recreation site averaged 185,583 visitations for the decade of the eighties. The Mt. Magazine and Queen Wilhelmina areas are considered to be very similar with respect to relative attractiveness as competing recreation areas. For this reason, an estimate of 185,000 visitations was considered to be correct. Considering the average of 433,000 visitations to Petit Jean State Park, the estimate should probably be considered to be low. There has been much growth in the potential market area identified in the CPS study with respect to population and income. At the same time there has not been any increase in mountaintop resorts that could be identified. In the past the lodges at Queen Wilhelmina, Mt. Nebo, and Petit Jean have been booked to capacity and, therefore, forced to turn customers away. This would indicate that the demand analysis is probably correct.

Using the Queen Wilhelmina site as a representative model for expenditures, an estimate was made for the Mt. Magazine project. The average estimates of travel expenditures for Polk County for 1985-89 were \$8,479,000 while for the two contiguous counties with similar attractiveness (Howard and Scott counties), the figures were \$3,350,000 and \$2,552,000, respectively. The implication is that the Queen Wilhelmina site added \$5,528,000 in visitor expenditures per year to the area's economy. The estimates for travel expenditures for the primary impact counties of Logan and Yell averaged \$2,843,000 and \$2,781,000, respectively for 1985-89 for a two county average of \$2,812,000. The Mt. Magazine recreation site was projected to add as much to the economy as the Queen Wilhelmina recreation site added. As a result, there would be an additional \$5,667,000 added to the primary impact area due to the lodge development ($8,479,000 - 2,812,000 = 5,667,000$).

For the sake of conservatism, the estimate was lowered to \$5.5 million. Adjustments were made to the increased tourist expenditures to the Mt. Magazine area to reflect the different development alternatives. For Alternative B the estimate was adjusted downward to \$3.5 million and for Alternative C it was \$4.0 million. Alternative E, the most elaborate of the development alternatives, was estimated upward to \$7.0 million. The Alternative D estimate of \$5.5 million was used as the basis for the adjustments for different development levels.

Primary Impact Area Multipliers

Economic effects can be analyzed in terms of both time and the economic variables impacted. For this project, the time element was dichotomized into short-term and long-term effects. Short-term effects are those economic effects associated with the construction period and the long-term effects are those associated with the resulting tourism from the various development alternatives being studied. The economic variables being impacted were trichotomized into: a) changes in gross sales; b) changes in employment; and c) changes in the total amount of wages and salaries paid.

The initial work for this analysis was completed by Dr. Dennis Beckmann at the University of Arkansas. He developed the original State of Arkansas econometric input/output model which identified and quantified the industrial linkages to tourism for the Arkansas economy. While this original model is quite extensive and elaborate, it

does provide an excellent starting point for the analysis of the Mt. Magazine development alternatives. Adjustments had to be made to the original statewide model to reflect only the impacts upon the primary impact areas of this project (Logan and Yell Counties).

Table E.21 summarizes the adjustments for the three different economic variables (sales, employment, wages and salaries) applied to the short-term construction phase for the primary impact area of Logan and Yell Counties. The first row values of Table E.21 are derived from the State model while the second row adjusts for the out-of-state leakages, that is, those changes in the economic variables that are external to Arkansas. It should be noted that this adjustment only applies to gross sales. The final row of Appendix Table E.21 presents the three values, after adjustment, of the estimated economic effects upon the primary impact area. Since not all the secondary effects from construction will be felt within the two county area, a downward adjustment was made. The results of this process are three primary impact area multipliers which can be used to determine the short-term effects for the different Mt. Magazine development alternatives.

Table E.22 summarizes the adjustments made to the State of Arkansas model to produce long-term effects upon the different economic variables. The only substantial long-term economic effects of the different development alternatives are associated with tourist expenditures. Tourism is not an identified industry in the original input/output model and, therefore, has no statewide multiplier. Therefore, the process of deriving reliable estimates of the economic impacts of the different Mt. Magazine alternatives was much more involved. The process to derive these estimates required the identification of industries related to tourist expenditures which were located within the primary impact area and which were also used as inputs in the original model. Adjustments were then made to each input industry and these results were then summed. Weights were assigned according to the approximate proportion of each dollar a tourist spends within these identified industries. The process is elaborated further in Tables E.22, E.24, and E.25, and the results are summarized in Table E.23. The last row of figures in Table E.23 represent the multiplier values for the primary impact area (P.I.A.) for the economic variables of gross sales, employment, and total wages and salaries. A simple explanation of the results shown in Table E.23 in non-economic terminology would be the following: a tourist expenditure of \$1.00 could be expected to add \$1.56 to total sales. Total tourism expenditures of one million dollars would add 18.5 jobs to Logan and Yell Counties, and tourism expenditures of one thousand dollars would add \$289.30 to wages and salaries of employed people within the primary impact area.

APPENDIX E: Part II

Table E-21. Summary of the comprehensive input/output model adjustments made to convert the three multipliers for construction effects to applicable values for the Mt. Magazine Project.

	Change in Gross Sales	Change in* Employment	Change in Total Wages and Salaries
Original I/O Model Result	2.0421	14.3893**	367.0999
Estimated Statewide Result	1.8120	14.3893	367.0999
Estimated PIA Result	1.3046	10.3603	291.3671***

* Estimated increase in employment for million dollars expenditure.

** Adjusted for current dollars, the original model had the value of 35.7321 but was based on 1977 price levels.

*** Adjusted for the PIA based on historical wage and salary differentials compared to state values. Based upon a one thousand dollar expenditure.

APPENDIX E: Part II

Table E-22. Summary of intermediate calculations for converting statewide I/O model results to travel related employment multiplier for the PIA of Mt. Magazine Project.

	Food and Kindred Products	Hotels	Eating and Drinking Places	Auto Repair and Services	Amusements and Other
Estimated Portion of Budget Allocated	.20	.15	.35	.20	.10
Original I/O Model Value	2.5555	1.5349	2.1358	1.6825	1.6981
Adjusted for AR	2.3142	1.3546	1.9503	1.4317	1.4385
PIA Portion	1.9462	1.2553	1.6842	1.3108	1.3156
Weighted Sum	1.5607				

Note: The weighted sum was computed by multiplying the change by the weight and then summing [e.g., (.9462)(.2) + (1.2553)(.15)...]

APPENDIX E: Part II

Table E-23. Summary of the comprehensive input/output model adjustments made to convert the three multipliers for related effects to applicable values for the Mt. Magazine Project.

	Change in Gross Sales	Change in* Employment	Change in Total Wages and Salaries
Original I/O Model Result	1.9951	25.8121**	364.4936
Estimated Statewide Result	1.7787	25.8121	364.4936
Estimated PIA Result	1.5607	18.5847	289.2985***

* Estimated increase in employment for million dollars expenditure.

** Adjusted for current dollars, the original model had the value of 35.7321 but was based on 1977 price levels.

*** Adjusted for the PIA based on historical wage and salary differentials compared to State values. Based upon a one thousand dollar expenditure.

APPENDIX E: Part II

Table E-24. Summary of intermediate calculations for converting statewide I/O model results to travel related employment multiplier for the PIA of Mt. Magazine Project.

	Food and Kindred Products	Hotels	Eating and Drinking Places	Auto Repair and Services	Amusements and Other
Estimated Portion of Budget Allocated	.20	.15	.35	.20	.10
Original I/O Model Value	34.4689	69.0443	94.0542	33.3539	72.5575
Adjusted for AR	13.8810	20.0189	27.2718	9.6707	21.0376
PIA Portion	9.9943	3.0028	9.5451	1.9341	2.1038
Weighted Sum	18.5847				

Note: The weighted sum was computed by multiplying Row 1 times Row 4 then summing [e.g. $(9.9943)(.2) + (3.0028)(.15) \dots$]

APPENDIX E: Part II

Table E-25. Summary of intermediate calculations for converting statewide I/O model results to travel related employment multiplier for the PIA of Mt. Magazine Project.

	Food and Kindred Products	Hotels	Eating and Drinking Places	Auto Repair and Services	Amusements and Other
Estimated Portion of Budget Allocated	.20	.15	.35	.20	.10
Original I/O Model Value	289.9218	375.7824	430.7272	298.5041	396.8505
Adjusted for PIA Wages and Salaries	46.0222	44.7399	119.6538	47.3845	31.4980
Weighted Sum	289.2985				

Note: The weighted sum was computed by multiplying Row 1 times Row 3 then summing [e.g. $(46.0222)(.2) + (44.7399)(.15) \dots$]

APPENDIX E:

Part III - Estimation of Revenue and Profit

The process of making predictions is inherently risky, and the estimation of future revenues and profits is especially chancy because of the large number of influencing factors. One noteworthy determinant which can introduce a significant amount of variation around a specific revenue or profit forecast that deserves to be mentioned is the "management-factor." A well-run establishment is capable of generating much greater revenues and profits than one that is poorly managed even if all other relevant factors are constant. This is demonstrated in the economy when some firms succeed where others fail in essentially identical circumstances except for a change in management.

A comparative technique was used to estimate revenues and profits for the various levels of development represented by the four change alternatives for Mt. Magazine. Queen Wilhelmina State Park was used as the comparative base. That is, the historical data relating to revenues and profits from this developed state park served as the reference point from which adjustments were made to predict the financial performance of Mt. Magazine. Queen Wilhelmina was selected for this role because of the many similarities with the proposed development of Mt. Magazine: 1) both lack a "water-attraction," 2) they are similarly removed from urban areas, 3) each are "mountaintop resorts", and 4) both are in the Ouachita Mountains of west central Arkansas. The years 1987 and 1988 were used as the time period for comparison because these years represented relatively stable economic times. In particular, the financial data from the years 1990 and 1991 were not used because these represented a period of perceived recession in the national economy that could adversely impact on the base values which in turn would understate the predicted values for "normal" times.

The data for Queen Wilhelmina show that for the years 1987 and 1988, the average yearly lodge revenue was \$9,732 per available room. The average annual non-lodge revenue was \$14,268 per available room. The data also show that net accounting profit (as reported by the Arkansas Department of Parks and Tourism) averaged 35 percent of total revenue for Queen Wilhelmina State Park for the years 1987 and 1988. With these averages as the comparative bases, Table E.26 has been created to present four different financial estimates for each of the four development alternatives for Mt. Magazine.

Although each of the alternatives presented a size range for the accommodations, a mean of each of these was used to estimate the values in Table E.26. Accordingly, the number of "rooms" available was estimated at 37, 47, 58, and 90 for Alternatives B, C, D, and E, respectively.

Notice that the financial estimates for Alternative C actually decline compared to Alternative B. Even though Alternative C will be more "developed" in terms of the total number of accommodations available, some of these accommodations will consist of "group accommodations" and a downward adjustment was therefore deemed appropriate since it was assumed that these renters would be less inclined to spend money not only on their accommodations but also for other goods and services.

No attempt was made to adjust for the time value difference in the dollar terms since these estimates were considered too rough for such "fine-tuning." It should be

pointed out that reported net profit for 1987 varied from a low of 26 percent to a high of 43 percent for the four state "lodge" parks, and that the same measurement of profit varied from a low of negative 123 percent to a high of 57 percent for monthly values. Given these ranges, time value adjustments were considered inappropriate. Although many caveats accompany the estimates presented in Table E.26, these values are believed to be useful guideposts for the purpose of comparing the alternatives presented in this report.

APPENDIX E: Part III

Table E-26. Estimated annual revenues and profits associated with Alternatives B through E of the Mt. Magazine EIS Project.

	Alternative B	Alternative C*	Alternative D	Alternative E
Estimated Yearly Cabin & Lodge Rental Revenue	\$370,000	\$343,000	\$564,000	\$876,000
Estimated Yearly Revenue from Other Sources	\$528,000	\$503,000	\$828,000	\$1,284,000
Total Estimated Yearly Revenue**	\$898,000	\$846,000	\$1,392,000	\$2,160,000
Estimated Yearly Net Accounting Profit**	\$314,000	\$296,000	\$487,000	\$756,000

Note: All estimates are based on average room associated revenue of Queen Wilhelmina for the years 1987 and 1988.

* A reduction factor of .75 was employed with Alternative C because of the "group accommodations" that would be associated with lower spending levels.

** Total yearly revenue and net accounting profit based on revenue generating facilities only (e.g., lodge, cabins, restaurant, concessions). O&M costs for non-revenue generating facilities not included in the revenue and profit estimates.

APPENDIX F:

Engineering

- Part I - Engineering Cost-Estimation Methodology
- Part II - Supporting Correspondence for Cost Estimates
- Part III - Detailed First and Annual Costs

APPENDIX F:

Part I - Engineering Cost Estimating Methodology

Five separate alternatives were evaluated for Mt. Magazine as a part of this DEIS. The development components of each alternative are described in Chapter 2.0. With the exception of Alternative A, which is the No Action, No Change Alternative, each alternative would include cost related modifications. All of the alternatives will result in ongoing annual costs.

First costs, or construction related costs, include allocations for work items such as a water line to Mt. Magazine; water storage and distribution facilities; sewage collection, treatment and disposal facilities; electric lines; roads; parking areas; structures (such as lodges, cabins, maintenance buildings, employee residences, pavilions, and bath houses); remote sanitary facilities; campgrounds and picnic areas; campground improvements; amphitheaters; sanitary stations; trails; and tools. Annual costs include personnel; water, electric, and telephone services; vehicle expenses; insurance; and general and miscellaneous expenses.

Although the Arkansas Department of Parks and Tourism will most likely phase the construction work, the cost estimates for the construction work are presented as if the improvements were constructed at the same time. The operation and maintenance costs are also estimated as if all of the proposed park facilities were constructed simultaneously. In addition, all of the cost estimates, both initial capital costs and operation and maintenance costs, are developed assuming full development within each alternative. For instance, although Alternative D calls for a 40-60 room lodge and 5-15 cabins, the cost estimates for Alternative D were developed assuming a 60 room lodge and 15 cabins. This cost estimating approach is not meant to imply that full development is advocated, but provides the maximum cost for each development alternative. The cost estimates were developed such that they would include all development that could take place within any alternative.

One potential development scenario is given as follows:

Phase 1	Construct water line and appurtenances.
Year 2	Construct the visitor information center, 30 camp units, one bath house, one residence, maintenance building, and associated access and utilities.
Year 3	Construct the lodge and associated access and utilities.
Year 4	Construct one pavilion and additional picnic sites at the East End Picnic Area. Complete the parking area and add the swimming pool at the lodge. Construct a residence, cabins, and trail.
Year 5	Construct a bath house, access, and utilities at the quarry camp area. Construct one pavilion and additional picnic sites at the Greenfield Picnic Area. Construct a residence and cabins, and rehabilitate four overlooks.
Year 6	Construct a residence, cabin, 19th century homestead, and trails, and rehabilitate four overlooks.

All initial capital costs and operation and maintenance costs are expressed in 1991 dollars. If park improvements are constructed over time, the costs for these improvements can be expected to change in accordance with changes in inflation. The basis for estimating each of these first and annual costs are discussed below.

First Costs

Provision of a dependable source of water for domestic and fire protection purposes is essential for each alternative except Alternative A. The U.S. Forest Service conducted a study in 1981 that evaluated potential sources of water supply for Mt. Magazine and potential water line rights-of-way to Mt. Magazine (Graham 1981). The study recommended that the source of supply be secured from the town of Blue Mountain. Blue Mountain purchases its water from the town of Magazine, which in turn purchases its water from the City of Booneville.

Both the towns of Magazine and Blue Mountain have indicated verbally that they would be willing to supply water sufficient to serve Mt. Magazine, if the City of Booneville would agree to provide them with enough water to meet the needs of Mt. Magazine. Booneville is willing to provide Mt. Magazine up to 30,000 gallons per day (see correspondence from the City of Booneville in Part II), which is the amount of water estimated to be needed under Alternative E.

The U.S. Forest Service water supply study evaluated several water line routes to Mt. Magazine and recommended a route on the west end of Mt. Magazine across an area known as Huckleberry Flats, and across the top of the west end of Mt. Magazine itself. However, after the study was completed, additional information was collected concerning scientific and natural resource aspects of Mt. Magazine.

The water line, storage tank, and last booster stations are proposed to be constructed along the existing power line right-of-way on the south side of Mt. Magazine. The line to Mt. Magazine would interconnect with an existing 4-inch line along Highway 10. A 4-inch PVC line would be constructed from the point of interconnection to approximate elevation 700 ft where the water tank and first booster station would be constructed. The tank and booster station would be accessible from the right-of-way and from Forest Development Road 1678.

To help minimize leakage and enhance service reliability, 4-inch ductile iron pipe would be utilized from the tank and first booster station to the last booster station at the top of Mt. Magazine. To improve booster station reliability, each station would have two pumps, each capable of pumping the desired amount of water. Also, about 85,000 gallons of water storage is proposed. This amount of storage is more than two days of storage for the most consumptive alternative (i.e., Alternative E).

The second booster station would be constructed at approximate elevation 1,180 ft and would be accessible along the right-of-way from the bottom of the Mountain. The third booster station would be constructed at approximate elevation 1,880 ft and would be accessible from an access road. The fourth booster station would be constructed at approximate elevation 2,580 ft and would be accessible from an access road. Although other water line routes are available, the proposed route was selected for several reasons. The selected route has less first costs than the route evaluated on the west end of the Mountain; is the more direct of the two routes; electricity exists in the selected route; and this route does not provide new and improved access to the west end of the Mountain.

Additionally, by utilizing the existing utility corridor for the water line, the number of intrusions in the Special Interest Area are minimized.

A quantity take-off was made for the water line construction work and unit cost and lump sum cost estimates were made for each item. Total estimated water line costs including engineering, contingencies, and land rights are shown Appendix F, Part III.

For each alternative that includes a lodge, two separate lodge locations were evaluated. Certain common costs for each location would be required. These common costs include water lines, roadways, power lines, and sewage lines. According to conversations with the local telephone company, no reimbursable construction costs probably would be incurred to extend phone service lines to proposed park improvements. Common cost estimates, including engineering and contingencies, are shown in Appendix F, Part III.

Estimated park improvement costs and sewage treatment costs are shown in Appendix F, Part III for each alternative, along with a cost estimate for an initial tools inventory for each alternative. Park improvements, sewage treatment requirements and the estimated tools inventory vary for each alternative. The tools inventory includes tractors, bush hogs, lawnmowers, weed eaters, chain saws, and hand tools.

Annual Costs

An estimate of the current annual costs for Alternative A was provided by the U.S. Forest Service (see correspondence from the U.S. Forest Service in Appendix F, Part II). Estimates of annual costs for all other alternatives are shown in Appendix F, Part III. Annual costs include personnel, water, electricity, vehicles, telephone, general and miscellaneous, and insurance.

An estimate of personnel required to operate and maintain each alternative was developed in conjunction with Arkansas Department of Parks and Tourism, State Parks Division utilizing Arkansas Department of Parks and Tourism position descriptions. Personnel requirements at similar facilities were used as a guide in estimating requirements for the various Mt. Magazine alternatives. Mid-level pay was assumed for each position and a 27 percent payroll loading was added. An allowance for part-time or seasonal personnel was included for each alternative, including a 12 percent payroll loading.

Water and electric use was estimated for each alternative. Water costs were calculated according to Blue Mountain's current water rates while electric costs were calculated according to the Arkansas Valley Electric Cooperative's current rates. All energy usage was assumed to be provided by electricity since there are no local gas distribution company lines readily available.

Vehicle costs include an allocation for both the vehicle's initial cost and annual operation and maintenance costs. Vehicle requirements were estimated in conjunction with Arkansas Department of Parks and Tourism personnel. Arkansas Department of Parks and Tourism vehicle costs and historical operational costs were also utilized. A five year life for all vehicles was assumed.

Telephone, general and miscellaneous, and building and contents insurance costs were estimated based on costs at similar Arkansas Department of Parks and Tourism facilities. General and miscellaneous costs include carpentry, plumbing, electrical, painting, building and grounds work, recreational and educational supplies, linens,

kitchen, janitorial, office supplies, solid waste disposal, postage, printing and advertising, and clothing/uniforms.

Annual costs do not include purchases for resale including food, beverages, vending machines, or gift shop items. The annual costs do not include adjustments for income from the lodge and cabin rentals, restaurant, camping, gift shop and other miscellaneous items.

Part II - Supporting Correspondence for Cost Estimates

United States
Department of
Agriculture

Forest
Service

Ozark-St. Francis
National Forests

P.O. Box 511
Paris, AR 72855-0511
501-963-3076

Reply to: 1950

Date: March 8, 1990

Stuart Noland
5210 Sherwood Rd.
Little Rock, AR 72207

Dear Stewart:

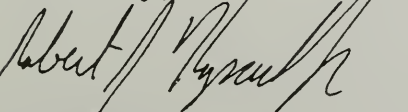
You recently inquired concerning our current operating costs for Mt. Magazine, to be used in the EIS analysis. Since our recreation, law enforcement, trails, clerical, and vehicle budgets are not separated by the areas we manage on the Magazine Ranger District, the figures below are a best estimate.

sewage pumping	570
mowing weedeating	2800
weekend cleanup	1650
landfill charges	100
building maintenance supplies (includes vandalism)	1000
road maintenance	1000
signs	350
brochures, postage	500
vehicle mileage	752
vehicle replacement	1581
trail maintenance (labor and supplies)	2000
cleaning, maintenance (labor and supplies)	4590
tree trimming (labor and supplies)	535
garbage can maintenance (bear damage, vandalism)	800
bulletin boards upkeep	940
law enforcement	3360
cooperative law enforcement	300
visitor information (receptionist)	1350
fire protection	836
resource management (controlled burning, etc)	1000
planning, budgeting and supervision overhead	2815

TOTAL \$ 28,829
(or approximately 30,000)

Feel free to call if you have any questions concerning these estimates of expenditures.

Sincerely,



ROB KOPACK
Team Leader, Mt Magazine EIS

STEWART NOLAND, P.E.
CONSULTING ENGINEER

5210 Sherwood Road • Little Rock, Arkansas 72207
(501) 661-9228

March 6, 1991

Booneville Water and Sewer System
c/o Keith Olsen
P.O. Box 237
Booneville, AR 72927

Re: Mount Magazine Environmental Impact Statement

Dear Mr. Olsen:

I am assisting FTN Associates in preparing an Environmental Impact Statement for proposed park developments on Mount Magazine. Several development alternatives are being evaluated.

Water supply will be required for some of the alternatives. The most likely source of water for Mount Magazine, according to a previously conducted study for the Ozark National Forest, is from the Blue Mountain Water System. Blue Mountain purchases its water from Magazine, which purchases its water from Booneville. Both Blue Mountain and Magazine have indicated a willingness to transmit/sell water to Mount Magazine assuming Booneville is willing to supply the water to Mount Magazine. The amount of water that may be needed by Mount Magazine could reach a maximum of 30,000 gallons per day (GPD).

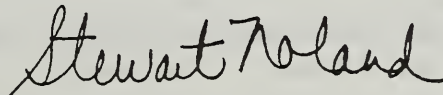
Therefore, please provide the following information concerning Booneville's ability and willingness to supply water to Mount Magazine.

1. The existing Booneville water supply source(s), its firm yield, and Booneville's treatment capacity
2. Whether Booneville has plans to increase its source of water supply and/or water treatment capacity
3. Current average daily and peak water supply demands on Booneville's system
4. Except Mount Magazine, any additional potential customers for Booneville water

5. Whether Booneville is willing to provide up to 30,000 GPD to Mount Magazine and for how long
6. Booneville's current wholesale water rates
7. If Booneville anticipates a change in wholesale water rates, when the change is anticipated to be effective and what the anticipated magnitude is of the change

If you wish to add any additional comments concerning this inquiry, feel free to do so. I thank you for your attention to this matter, and would appreciate your response by March 15. Should you have any questions concerning this letter, please contact me.

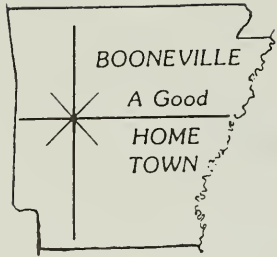
Yours truly,

A handwritten signature in cursive script that reads "Stewart Noland".

Stewart Noland

cc: Lisa Gandy

mtmag08:drn



City of Booneville, Arkansas

City Hall, 56 West 2nd Street
Booneville, Arkansas 72927

Brian Mueller
Mayor

MELINDA SMITH
Clerk-Treasurer

PAUL DANIELSON
City Attorney

July 12, 1991

Mr. Stewart Noland
Consulting Engineer
5210 Sherwood Road
Little Rock Ar 72207

Re: Mount Magazine Enviromental Impact Statement

Dear M. Noland,

I am providing you the following information pursuant to your inquiry of March 6, 1991.

1. The existing Booneville Water supply source(s) firm yield is four (4) million gallons per day. Booneville's treatment capacity is three (3) million gallons per day.
2. Booneville has no plans at the present to increase its source of water supply and/or water treatment capacity.
3. The current average daily and peak water supply demands on Booneville's water system is 1.2 million gallons per day.
4. Additional potential customers for Booneville Water at this time are the Sugar Grove Water Association.
5. Booneville is willing to provide up to 30,000 gallons per day to Mt. Magazine.
6. Booneville's current wholesale water rates are as follows:
1.05 per thousand gallons
7. We anticipate no changes in the wholesale water rates at this time.

If I can be of further assistance to you, do not hesitate to contact me.

Very Truly Yours,

Brian Mueller
Brian K. Mueller, Mayor

cc: Booneville Water Department

CITY COUNCIL MEETING
MARCH 18, 1991

The City Council of the City of Booneville met in their regular session in City Hall at 5:00 p.m., March 18, 1991.

Mayor Mueller called the meeting to order. Clerk Smith called the roll with the following Aldermen present, Cauthron, Wilson, Taylor, Lovett, Dunn and Springer.

Alderman Dunn made the motion the minutes of the February meeting be approved as presented. Alderman Taylor seconded the motion. The affirmative vote was unanimous.

Mr. Keith Olsen spoke on two items for the Water Dept. The Water Dept. wants to sell water to the Sugar Grove community provided the community can form a water association. Mr. Olsen also stated the Water Dept. wants to increase the amount of water being sold to Magazine by 30,000 gallons per day. Magazine, in turn, could sell to Blue Mountain. Blue Mountain could then sell to Mt. Magazine if they chose to. Alderman Dunn asked if Booneville had the extra resources to sell extra water without causing any hardship to the City of Booneville. Mr. Olsen stated that Booneville was not using even half of its capacity per day as they produce over 3,000,000 gallons per day and the usage is only 800,000 gallons per day. Mr. Olsen said the Water Commission backed the two proposals and this would pose no extra expense to the City of Booneville. Alderman Dunn made the motion to approve the sell to both areas and Alderman Springer seconded the motion. A roll call vote was taken with all Aldermen present voting yes.

STEWART NOLAND, P.E.
CONSULTING ENGINEER

5210 Sherwood Road • Little Rock, Arkansas 72207
(501) 661-9228

February 22, 1991

Mr. Mike Core
Arkansas Department of Pollution Control and Ecology
P.O. Box 8913
Little Rock, AR 72219-8913

Dear Mike:

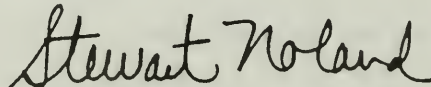
I am assisting FTN Associates in preparing an Environmental Impact Statement for proposed park developments on Mount Magazine in Logan County, Arkansas. Several development alternatives are being evaluated.

Sewage treatment and disposal will be required for some of the alternatives. It is anticipated that a package sewage treatment plant will be utilized to minimize the amount of land needed for sewage treatment. Three possible locations for the sewage treatment facilities are shown on the attached map. One location would discharge to Big Shoal Creek (Bear Hollow), a tributary of Lake Dardanelle, while the other two would discharge to tributaries of Rock Creek, a tributary of the Petit Jean River. The estimated discharge flows could range from 10,000 - 30,000 gallons per day.

Please review this preliminary information and advise me of what the anticipated discharge requirements would be.

I appreciate your attention to this matter. Should you have any questions concerning this letter, please contact me.

Yours truly,


Stewart Noland

cc: Lisa Gandy

Attachments

mtmag07



STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72219-8913
PHONE: (501) 562-7444
FAX: (501) 562-4632



March 1, 1991

Mr. Stewart Nolan, P.E.
5210 Sherwood Road
Little Rock, AR 72207

RE: Proposed Park on Magazine Mountain

Dear Mr. Nolan:

This is to advise you that effluent limits have been established as follows for the proposed discharge:

May-October	25/30/5
November-April	30/30
For CBOD(5)/TSS/NH3-N	

Additionally, bacterial limits of 1000/100 ml will apply.

Should you have any questions, please contact me at 570-2169.

Sincerely,

A handwritten signature in cursive script that reads "Michael L. Core".

Michael L. Core
Engineer Supervisor
NPDES Branch

MLC:lks

STEWART NOLAND, P.E.
CONSULTING ENGINEER

5210 Sherwood Road • Little Rock, Arkansas 72207
(501) 661-9228

February 22, 1991

Mr. Robert Hart
Arkansas Department of Health
4815 West Markham
Little Rock, AR 72201

Re: Mount Magazine Environmental Impact Statement

Dear Robert:

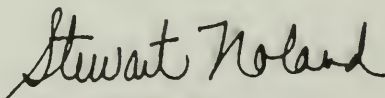
I am assisting FTN Associates in preparing an Environmental Impact Statement for proposed park developments on Mount Magazine in Logan County, Arkansas. Several development alternatives are being evaluated.

Sewage treatment and disposal will be required for some of the alternatives. It is anticipated that a package sewage treatment plant will be utilized to minimize the amount of land needed for sewage treatment. Subject to confirmation by the Arkansas Department of Pollution Control and Ecology, the plant will be designed to meet 10 mg/l BOD/15 mg/l TSS effluent limits, and include provisions for disinfection. Three possible locations for the sewage treatment facilities are shown on the attached map. One location would discharge to Big Shoal Creek (Bear Hollow), a tributary of Lake Dardanelle, while the other two would discharge to tributaries of Rock Creek, a tributary of the Petit Jean River. The estimated discharge flows could range from 10,000 - 30,000 gallons per day.

Please review this preliminary information and advise me of any additional requirements or considerations that the Health Department may have in respect of sewage treatment and disposal on Mount Magazine.

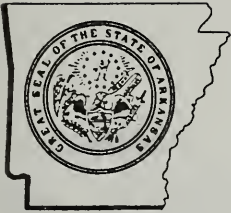
I appreciate your attention to this matter. Should you have any questions concerning this letter, please contact me.

Yours truly,


Stewart Noland

cc: Lisa Gandy
Attachment

mtmag05



BILL CLINTON
GOVERNOR

Arkansas DEPARTMENT OF HEALTH

4815 WEST MARKHAM STREET • LITTLE ROCK, ARKANSAS 72205
TELEPHONE AC 501 661-2000

M. JOYCELYN ELDERS, M.D.
DIRECTOR

May 22, 1991

Mr. Stewart Noland, P.E.
5210 Sherwood Road
Little Rock, Arkansas 72207

RE: Mount Magazine Environmental Impact Statement
Logan County, AR

Dear Mr. Noland:

The report submitted for the project referenced above has been reviewed by this office and we concur with the proposal in general with the following provisions.

The easternmost proposed site that discharges to Bear Hollow is the preferred discharge route in that no residences appear to be affected by the proposed discharge.

The material is being retained for our files.

Sincerely,

A handwritten signature in cursive script, appearing to read "Robert Hart".

Robert Hart, P.E.
Chief Engineer
Division of Engineering

RH:LRP:MF:1km

ID#70/38

Part III - Detailed First and Annual Costs

Water Line Construction Costs

<u>Item</u>		<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Amount</u>
1.	4"x4" tapping sleeve with gate valve and box	EA	1	\$ 800	\$ 800
2.	4" PVC waterline to tank	LF	5,000	6	30,000
3.	Approx. 17'dia. x 32' high water storage tank with appurtenances	LS			71,555
4.	Blue Mountain pump station	EA	1		63,339
5.	Mount Magazine pump station	EA	4		340,543
6.	85,000 gallon concrete water storage tank on Mount Magazine	EA			98,020
7.	4" DIP waterline to Mount Magazine	LF	8,000	40	320,000
8.	6" PVC waterline on Mount Magazine	LF	4,300	7.50	32,250
9.	Rock excavation	CY	3,000	30	90,000
10.	Bedding material	CY	2,500	5	12,500
11.	Locator tape	LF	9,300	0.50	4,650
12.	6" gate valve and box	EA	4	550	2,200
13.	4" gate valve and box	EA	8	400	3,200
14.	2" blow-off assembly	EA	4	350	1,400
15.	Combination air release valve	EA	6	350	2,100
16.	Master meter vault	EA	1		12,000
17.	Cast iron fittings	LB	5,000	1	5,000
18.	Control cable	LF	12,300	0.50	6,150
19.	Mobilization/demobilization	LS			53,995
20.	Waterline access road	LS			184,400
Subtotal					\$1,334,102
Professional fees					140,080
Contingency					147,418
Subtotal					\$1,621,600
Land Rights					5,000
Total					\$1,626,600

Common Costs for Original Lodge Location

	<u>Item</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Amount</u>
1.	6" waterline to lodge, cabins, visitor information center, employee residences, maintenance building	LF	11,700	\$ 7.50	\$ 87,750
2.	6" gate valve and box	EA	4	550	2,200
3.	2" blow-off assembly	EA	2	350	700
4.	Locator tape	LF	11,700	0.10	1,170
5.	Cast iron fittings	LB	1,000	1	1,000
6.	20' roadway	100 ' STA.	4.5	4,500	20,250
7.	Powerline to Mt. Magazine, booster stations	LF	15,900	5	79,500
8.	Powerline to lodge, visitor information center, residences, cabins (some reconductor)	LF	13,000	3	39,000
9.	Sewage effluent line to elevation 1600	LF	3,000	20	60,000
10.	Sewage force main from cabins and lodge to sewage treatment plant	LF	3,000	6	18,000
11.	Sewage force main from visitor information center and residences to sewage treatment plant	LF	10,500	6	63,000
12.	Fire hydrants	EA	12	800	<u>9,600</u>
			Subtotal		\$ 382,170
			Professional fees		45,860
			Contingency		<u>42,800</u>
			Total		\$ 470,830

Common Costs for Bear Hollow Lodge Location

	<u>Item</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Amount</u>
1.	6" waterline	LF	16,700	\$ 7.50	\$ 125,250
2.	6" gate valve and box	EA	6	550	3,300
3.	2" blow-off assembly	EA	4	350	1,400
4.	Locator tape	LF	16,700	0.10	1,670
5.	Cast iron fittings	LB	1,500	1	1,500
6.	10" bore and encasement	LF	50	50	2,500
7.	20' roadway	100' STA	1	4,500	4,500
8.	24' roadway	100' STA	2	5,300	10,600
9.	Powerline to Mt. Magazine, booster stations	LF	15,900	5	79,500
10.	Powerline to visitor information center, residences (some reconductor)	LF	13,000	3	39,000
11.	Powerline to lodge, cabins	LF	6,000	5	30,000
12.	Sewage effluent line to elevation 1600	LF	3,000	20	60,000
13.	Sewage force main from cabins and lodge to sewage treatment plant	LF	2,500	6	15,000
14.	Sewage force main from visitor information center and residences to sewage treatment plant	LF	5,500	6	33,000
15.	Fire hydrants	EA	12	800	9,600
			Subtotal		\$ 416,820
			Professional fees		50,020
			Contingency		46,680
			Total		\$ 513,520

Alternative B Park Improvements Construction Costs

<u>Item</u>	<u>Cost</u>
1. Barrier free, unisex compost toilets at hang gliding, rock climbing, and quarry horse camp areas	\$ 48,000
2. 18 - 20 room lodge with deck, restaurant, meeting room, gift shop, laundry, storage, office, reception area, lobby, and restrooms (16,240 sf); with parking for 50 cars	1,880,111
3. 18 housekeeping cabins (1000 sf) with parking for 2 cars	1,808,000
4. Amphitheater (40 people)	10,000
5. Visitor information center with 5 offices, lab, restroom, exhibit/display area, storage, reception/sales area (4700 sf); and parking for 20 cars	474,444
6. Employee residences (2 near lodge, 4 near visitor information center) (1344 sf), including utilities and parking	600,000
7. One 2-bay maintenance building (1500 sf) with fence and yard, located near visitor information center	100,000
8. 10,000 gallon per day sewage treatment plant	67,500
9. Simplex sewage pump stations (27 ea.)	<u>108,000</u>
Subtotal	\$5,096,055
Professional fees	541,235
Contingency	<u>563,730</u>
Total	\$6,201,020

Alternative B Annual Costs

<u>Item</u>	<u>Cost</u>
1. Personnel (superintendent, assistant superintendent, ranger, 2 interpreters/resource managers, 2 clerical at visitor information center, lodge manager, 3 lodge clerks, 3 housekeepers, 3 park aids, restaurant manager, 2 waitresses) including an allowance of \$150,000 for part time labor	\$ 627,500
2. Water (291,570 gallons per month)	4,800
3. Electric (142,830 KWH per month)	98,160
4. Sewage treatment plant consumables	500
5. Vehicles (3 - 1/2 ton trucks, 2 ranger cars, 1 van, 1 - 2 1/2 ton truck)	34,820
6. Telephone	18,900
7. General and miscellaneous expenses	69,000
8. Building and contents insurance	<u>4,410</u>
Total	\$ 858,090

Alternative B Cost SummaryORIGINAL LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$1,402,500
2. Common to Original Lodge Location	470,830
3. Park Improvements	6,201,020
4. Tools Inventory	<u>21,400</u>
Total	\$8,095,750

Annual Cost

1. Personnel	627,500
2. Water	4,800
3. Electric	98,160
4. STP Consumables	500
5. Vehicles	34,820
6. Telephone	18,900
7. General and miscellaneous	69,000
8. Insurance	<u>4,410</u>
Total	\$ 858,090

BEAR HOLLOW LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$1,402,500
2. Common to Bear Hollow Lodge Location	513,520
3. Park Improvements	6,201,020
4. Tools Inventory	<u>21,400</u>
Total	\$8,138,440

Annual Cost

1. Personnel	\$ 627,500
2. Water	4,800
3. Electric	54,290
4. STP Consumables	500
5. Vehicles	34,820
6. Telephone	18,900
7. General and miscellaneous	69,000
8. Insurance	<u>4,410</u>
Total	\$ 858,090

Alternative C Park Improvements Construction Costs

<u>Item</u>	<u>Cost</u>
1. Barrier free, unisex compost toilets at hang gliding, rock climbing, and quarry horse camp areas	\$ 48,000
2. 18 - 20 room lodge with deck, restaurant, meeting room, gift shop, laundry, storage, office, reception area, lobby, and restrooms (16,240 sf); with parking for 50 cars	1,880,111
3. 18 housekeeping cabins (1000 sf) with parking for 2 cars	1,808,000
4. Amphitheater (40 people)	10,000
5. Visitor information center with 5 offices, lab, restroom, exhibit/display area, storage, reception/sales area (4700 sf); and parking for 20 cars	474,444
6. Gate house (300 sf) with parking for 2 cars	30,500
7. Pavilion with parking for 20 cars	54,444
8. Employee residences (2 near lodge, 4 near visitor information center) (1344 sf), including utilities and parking	600,000
9. One 2-bay maintenance building (1500 sf) with fence and yard, located near visitor information center	100,000
10. 20 camp units without water at quarry horse camp, including 2100 feet of 20 foot wide roadway	194,500
11. 10,000 gallon per day sewage treatment plant	67,500
12. Simplex sewage pump stations (28 ea.)	<u>112,000</u>
Subtotal	\$5,379,499
Professional fees	571,131
Contingency	<u>595,060</u>
Total	\$6,545,690

Alternative C Annual Costs

<u>Item</u>	<u>Cost</u>
1. Personnel (superintendent, assistant superintendent, ranger, 2 interpreters/resource managers, 2 clerical at visitor information center, lodge manager, 3 lodge clerks, 3 housekeepers, 4 park aids, restaurant manager, 2 waitresses) including an allowance of \$175,000 for part time labor	\$ 675,780
2. Water (322,140 gallons per month)	5,280
3. Electric (144,165 KWH per month)	99,390
4. Sewage treatment plant consumables	750
5. Vehicles (3 - 1/2 ton trucks, 2 ranger cars, 1 van, 1 - 2 1/2 ton truck)	34,820
6. Telephone	19,200
7. General and miscellaneous expenses	72,000
8. Building and contents insurance	<u>4,440</u>
Total	\$ 911,660

Alternative C Cost SummaryORIGINAL LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$1,402,500
2. Common to Original Lodge Location	470,830
3. Park Improvements	6,545,690
4. Tools Inventory	<u>21,400</u>
Total	\$8,440,420

Annual Cost

1. Personnel	675,780
2. Water	5,280
3. Electric	99,390
4. STP Consumables	750
5. Vehicles	34,820
6. Telephone	19,200
7. General and miscellaneous	72,000
8. Insurance	<u>4,440</u>
Total	\$ 911,660

BEAR HOLLOW LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$1,402,500
2. Common to Bear Hollow Lodge Location	513,520
3. Park Improvements	6,545,690
4. Tools Inventory	<u>21,400</u>
Total	\$8,483,110

Annual Cost

1. Personnel	\$ 675,780
2. Water	5,280
3. Electric	99,390
4. STP Consumables	750
5. Vehicles	34,820
6. Telephone	19,200
7. General and miscellaneous	72,000
8. Insurance	<u>4,440</u>
Total	\$ 911,660

Alternative D Park Improvements Construction Costs

<u>Item</u>	<u>Cost</u>
1. Barrier free, unisex compost toilets at hang gliding and rock climbing areas	\$ 32,000
2. 40 - 60 room lodge with deck, restaurant, 2 meeting rooms, covered swimming pool, gift shop, laundry, storage, office, reception area, lobby, restrooms and maintenance (45,860 sf); with parking for 100 cars	5,198,200
3. 15 housekeeping cabins (1000 sf) with parking for 2 cars	1,506,667
4. 20 camp units with water at quarry horse camp, including 2100 feet of 20 foot wide roadway	214,500
5. Bath house at Cameron Bluff and quarry horse camp	221,780
6. 13 picnic sites located at East End and Greenfield	27,300
7. 2 pavilions with restrooms at East End and Greenfield	280,000
8. 2 amphitheaters (40 people each)	20,000
9. Employee residences (2 near lodge, 4 near visitor information center) (1344 sf), including utilities and parking	600,000
10. One 3-bay maintenance building (2100 sf) with fence and yard, located near visitor information center	125,000
11. Sanitary station	15,000
12. Reconstructed homestead with parking for 20 cars	154,444
13. Rehabilitate 8 overlooks	40,000
14. Visitor information center with 5 offices, lab, restroom, exhibit/display area, storage, reception/sales area (4700 sf); and parking for 20 cars	474,444
15. Trails (15 miles)	<u>30,000</u>
Subtotal	\$ 8,939,335
Professional fees	938,630
Contingency	<u>987,800</u>
Total	\$10,865,765

Alternative D Water, Sewer, and Electric Utility Improvements
Construction Costs

	<u>Item</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Amount</u>
1.	20,000 GPD sewage treatment plant	LS			\$ 90,000
2.	Simplex sewage pump stations	EA	28	\$ 4,000	112,000
3.	Sewage force main from Cameron Bluff bath house to sewage treatment plant at:				
	a. Original lodge location	LF	3,000	6	18,000
	b. Bear Hollow lodge location	LF	7,500	6	45,000
4.	Powerline to Cameron Bluff bath house	LF	3,000	3	9,000
5.	Sewage force main from quarry horse camp bath house to sewage treatment plant at:				
	a. Original lodge location	LF	9,500	6	57,000
	b. Bear Hollow lodge location	LF	5,000	6	30,000
6.	Powerline to quarry horse camp bath house from:				
	a. Original lodge location	LF	9,500	3	28,500
	b. Bear Hollow lodge location	LF	5,000	3	15,000
7.	Sewage force main to Greenfield pavilion	LF	300	6	1,800
8.	Powerline to Greenfield pavilion	LF	300	3	900
9.	Sewage force main to East End pavilion	LF	8,200	6	49,200
10.	Powerline to East End pavilion	LF	8,200	3	24,600
11.	2" waterline to Cameron Bluff	LF	1,700	5	8,500
12.	2" gate valve and box	EA	2	200	400
13.	2" blow-off assembly	EA	1	350	350
14.	3" waterline to quarry horse camp	LF	9,500	6	57,000
15.	3" gate valve and box	EA	2	300	600
16.	2" blow-off assembly	EA	1	350	350
17.	2" water line to Greenfield	LF	300	5	1,500
18.	2" gate valve and box	EA	1	200	200
19.	2" blow-off assembly	EA	1	350	350

20.	6" bore and encasement	LF	50	30	1,500
21.	2" waterline to East End	LF	8,200	5	41,000
22.	2" gate valve and box	EA	2	200	400
23.	2" blow-off assembly	EA	1	350	350
24.	Fire hydrants	EA	4	800	<u>3,200</u>

Subtotal Original lodge location \$ 506,700

Subtotal Bear Hollow lodge location 493,200

Professional fees Original lodge location 60,800

Professional fees Bear Hollow lodge location 59,180

Contingency Original lodge location 56,750

Contingency Bear Hollow lodge location 55,240

Total Original lodge location \$ 624,250

Total Bear Hollow lodge location \$ 607,620

Alternative D Annual Costs

<u>Item</u>	<u>Cost</u>
1. Personnel (superintendent, assistant superintendent, ranger, 3 interpreters/resource managers, 2 clerical at visitor information center, lodge manager, 3 lodge clerks, 5 housekeepers, 4 park aids, restaurant manager, cook, 3 waitresses) including an allowance of \$250,000 for part time labor	\$ 911,230
2. Water (625,890 gallons per month)	10,080
3. Electric (228,425 KWH per month)	155,470
4. Sewage treatment plant consumables	1,000
5. Vehicles (3 - 1/2 ton trucks, 3 ranger cars, 1 van, 1 - 2 1/2 ton truck, 1 - 1 ton pick-up)	45,060
6. Telephone	30,000
7. General and miscellaneous expenses	82,000
8. Building and contents insurance	<u>7,340</u>
Total	\$1,242,180

Alternative D Cost SummaryORIGINAL LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$ 1,402,500
2. Common to Original Lodge Location	470,830
3. Park Improvements	10,865,770
4. Water, Sewer, and Electric Utility Improvements	624,250
5. Tools Inventory	<u>23,000</u>
Total	\$13,386,350

Annual Cost

1. Personnel	\$ 911,230
2. Water	10,080
3. Electric	155,470
4. STP Consumables	1,000
5. Vehicles	45,060
6. Telephone	30,000
7. General and miscellaneous	82,000
8. Insurance	<u>7,340</u>
Total	\$1,242,180

BEAR HOLLOW LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$ 1,402,500
2. Common to Bear Hollow Lodge Location	513,520
3. Park Improvements	10,865,770
4. Water, Sewer, and Electric Utility Improvements	607,620
4. Tools Inventory	<u>23,000</u>
Total	\$13,412,410

Annual Cost

1. Personnel	\$ 911,230
2. Water	10,080
3. Electric	155,470
4. STP Consumables	1,000
5. Vehicles	45,060
6. Telephone	30,000
7. General and miscellaneous	82,000
8. Insurance	<u>7,340</u>
Total	\$ 1,242,180

Alternative E Park Improvements Construction Costs

<u>Item</u>	<u>Cost</u>
1. Restroom at hang gliding and rock climbing areas	\$ 156,000
2. 60 - 90 room lodge with deck, restaurant, 3 meeting rooms, covered swimming pool, 2 tennis courts with lights, gift shop, laundry, storage, office, reception area, lobby, 3 restrooms and maintenance (67,060 sf); with parking for 150 cars	7,562,600
3. 20 housekeeping cabins (1000 sf) with parking for 2 cars	2,008,890
4. 20 camp units with water at quarry horse camp, including 2100 feet of 20 foot wide roadway, and 20 camp units with water at Cameron Bluff	334,500
5. Bath house at Cameron Bluff and quarry horse camp	221,780
6. 18 picnic sites located at East End and Greenfield	37,800
7. 3 pavilions with restrooms at East End, Greenfield, and quarry horse camp	420,000
8. 2 amphitheaters (40 people each)	20,000
9. Employee residences (2 near lodge, 4 near visitor information center) (1344 sf), including utilities and parking	600,000
10. One 3-bay maintenance building (2100 sf) with fence and yard, located near visitor information	125,000
11. Sanitary station	15,000
12. Reconstructed homestead with parking for 20 cars	154,444
13. Rehabilitate 8 overlooks	40,000
14. Visitor information center with 5 offices, lab, restroom, exhibit/display area, storage, reception/sales area (4700 sf); and parking for 40 cars	478,890
15. Trails (15 miles)	<u>30,000</u>
Subtotal	\$12,204,904
Professional fees	1,281,515
Contingency	<u>1,348,642</u>
Total	\$14,835,061

Alternative E Water, Sewer, and Electric Utility Improvements
Construction Costs

<u>Item</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Amount</u>
1. 25,000 GPD sewage treatment plant	LS			\$ 112,500
2. Simplex sewage pump stations	EA	37	\$ 4,000	148,000
3. Sewage force main from Cameron Bluff bath house to sewage treatment plant at:				
a. Original lodge location	LF	3,000	6	18,000
b. Bear Hollow lodge location	LF	7,500	6	45,000
4. Powerline to Cameron Bluff bath house	LF	3,000	3	9,000
5. Sewage force main from quarry horse camp bath house to sewage treatment plant at:				
a. Original lodge location	LF	9,500	6	57,000
b. Bear Hollow lodge location	LF	5,000	6	30,000
6. Powerline to quarry horse camp bath house from:				
a. Original lodge location	LF	9,500	3	28,500
b. Bear Hollow lodge location	LF	5,000	3	15,000
7. Sewage force main to Greenfield pavilion	LF	300	6	1,800
8. Powerline to Greenfield pavilion	LF	300	3	900
9. Sewage force main to East End pavilion	LF	8,200	6	49,200
10. Powerline to East End pavilion	LF	8,200	3	24,600
11. 2" waterline to Cameron Bluff	LF	1,700	5	8,500
12. 2" gate valve and box	EA	2	200	400
13. 2" blow-off assembly	EA	1	350	350
14. 3" waterline to quarry horse camp	LF	9,500	6	57,000
15. 3" gate valve and box	EA	2	300	600
16. 2" blow-off assembly	EA	1	350	350
17. 2" water line to Greenfield	LF	300	5	1,500
18. 2" gate valve and box	EA	1	200	200
19. 2" blow-off assembly	EA	1	350	350

20.	6" bore and encasement	LF	50	30	1,500
21.	2" waterline to East End	LF	8,200	5	41,000
22.	2" gate valve and box	EA	2	200	400
23.	2" blow-off assembly	EA	1	350	350
24.	Fire hydrants	EA	6	800	<u>4,800</u>

Subtotal Original lodge location \$ 566,800

Subtotal Bear Hollow lodge location 553,300

Professional fees Original lodge location 68,020

Professional fees Bear Hollow lodge location 66,400

Contingency Original lodge location 63,480

Contingency Bear Hollow lodge location 61,970

Total Original lodge location \$ 698,300

Total Bear Hollow lodge location \$ 681,670

Alternative E Annual Costs

<u>Item</u>	<u>Cost</u>
1. Personnel (superintendent, assistant superintendent, ranger, 3 interpreters/resource managers, 2 clerical at visitor information center, lodge manager, lodge assistant manager 3 lodge clerks, 6 housekeepers, 4 park aids, restaurant manager, cook, 3 waitresses) including an allowance of \$300,000 for part time labor	\$ 967,860
2. Water (892,890 gallons per month)	14,280
3. Electric (308,050 KWH per month)	208,470
4. Sewage treatment plant consumables	1,250
5. Vehicles (3 - 1/2 ton trucks, 3 ranger cars, 1 sedan, 1 van, 1 - 2 1/2 ton truck, 2 - 1 ton pick-ups)	54,420
6. Telephone	35,000
7. General and miscellaneous expenses	95,000
8. Building and contents insurance	<u>8,290</u>
Total	\$1,384,570

Alternative E Cost SummaryORIGINAL LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$ 1,402,500
2. Common to Original Lodge Location	470,830
3. Park Improvements	14,835,060
4. Water, Sewer and Electric Utility Improvements	698,300
5. Tools Inventory	<u>25,000</u>
Total	\$17,431,690

Annual Cost

1. Personnel	\$ 967,860
2. Water	14,280
3. Electric	208,470
4. STP Consumables	1,250
5. Vehicles	54,420
6. Telephone	35,000
7. General and miscellaneous	95,000
8. Insurance	<u>8,290</u>
Total	\$1,384,570

BEAR HOLLOW LODGE LOCATIONFirst Cost

1. Water Supply to Mount Magazine	\$ 1,402,500
2. Common to Bear Hollow Lodge Location	513,520
3. Park Improvements	14,835,060
4. Water, Sewer, and Electric Utility Improvements	681,670
5. Tools Inventory	<u>25,000</u>
Total	\$17,457,750

Annual Cost

1. Personnel	\$ 967,860
2. Water	14,280
3. Electric	208,470
4. STP Consumables	1,250
5. Vehicles	54,420
6. Telephone	35,000
7. General and miscellaneous	95,000
8. Insurance	<u>8,290</u>
Total	\$ 1,384,570

COST SUMMARY

<u>ALTERNATIVE</u>		<u>LODGE LOCATION</u>	
		<u>ORIGINAL</u>	<u>BEAR HOLLOW</u>
A	First Cost	-	-
	Annual O&M	\$ 30,000	-
B	First Cost	\$ 8,319,850	\$ 8,362,540
	Annual O&M	\$ 858,090	\$ 858,090
C	First Cost	\$ 8,664,520	\$ 8,707,210
	Annual O&M	\$ 911,660	\$ 911,660
D	First Cost	\$13,610,450	\$13,636,510
	Annual O&M	\$ 1,242,180	\$ 1,242,180
E	First Cost	\$17,655,790	\$17,681,850
	Annual O&M	\$ 1,384,570	\$ 1,384,570

Calculations for Road Improvements and Expansions Common to Alternatives B through E (see Note).

Horsecamp road at quarry site	2,100 ft x 20 ft
Roads for lodge, cabins*, and wastewater treatment	2,500 ft x 20 ft*
Employee residence area	500 ft x 20 ft
Maintenance bay road	200 ft x 20 ft
Gravel water line road	8,200 ft x 40 ft
<hr/>	
Total	434,000 ft ² (9.96 Acres)

* Based on roads for 5 cabins

Note: Acreage calculations shown in Table 2.2 include calculations for additional cabins and recreational facilities not included above (e.g., 19th Century Homestead).

APPENDIX G:

Written and Oral Comments and Responses

- Part I - Comment Letters and Responses: Introduction
- Part II - Alphabetical List of Commentors
- Part III - Written Comments
- Part IV - Oral Comments
 - Little Rock, Arkansas Meeting - 22 September 1992
 - Paris, Arkansas Meeting - 29 September 1992

Appendix G:

Part I - Comment Letters and Responses: Introduction

This appendix contains an alphabetical list of people and/or organizations who provided written comments on the DEIS, complete copies of comment letters received about the DEIS, and responses to these letters.

Each letter is numbered in the order in which it was received. This number is in the top right corner of the letter. In the letter, paragraphs to which substantive comments were prepared are indicated by "A," "B," etc. in the left margin. Prepared responses are located next to the letter (on the right half of the page) and are lettered to correspond to specific comments.

Oral comments presented at the 22 September and 29 September 1992 public meetings in Little Rock and Paris, respectively, were transcribed from tape recordings of the meetings. In two instances, in the case of respondents #2 and #3 at the Paris meeting, the oral comments were not captured in the recording process. The two respondents were asked to submit written comments to substitute for the lost oral comments.

Because some comments are similar, responses sometimes refer to another letter where that comment has already been addressed. References to sections or pages of text specify the DEIS or the FEIS, because there are some variations in the two different documents.

Some comments were incisive and prompted changes in the FEIS. Some led to strengthened mitigation measures in Section 4.7, while others led to editorial improvements. Such changes are explicitly mentioned in the responses to the applicable comments.

Appendix G:

Part II - Alphabetical list of people and
organizations who commented on the DEIS.

<u>Individuals</u>	<u>Letter No.</u>	<u>Individuals</u>	<u>Letter No.</u>
Anderson, Valorie J. Individual	13	Conroy, Sharon Individual	16
Barnhard, Mark Individual	45	Corbitt, David Individual	18
Bilheimer, Roy AR Real Estate Commission	12	DeLamar, Nancy AR Nature Conservancy	60
Boulden, Carolyn Individual	48	Dunn, Don Individual	15
Boyles, Richard Individual	41	Feyaldenhoven, Carl Individual	14
Brazil, Ken AR Soil & Water Conserv. Comm.	24	Fink, Elizabeth and George Individual	34
Brown, David E. Individual	36	Gallagher, Matt Arkansas Herpetological Society	25
Buford, Cathy AR Historic Preserv. Program	39	Gallman, Judith Individual	50
Burtram-Stanley, Audrey Stanley, James Individual	58	Gordon, Richard, Jr. Public Awareness Comm., Inc.	22
Cahoone, Becky L. Individual	2	Green, Garvin Individual	1
Carlton, Dr. Chris Individual	59	Grimmett, Harold Arkansas Natural Heritage Comm.	27
Casey, John Dogwood Trails Audubon Society	44	Harris, Helen Individual	29
Clark, Emogene Tilman Individual	3	Hender, Fred Individual	51

<u>Individuals</u>	<u>Letter No.</u>	<u>Individuals</u>	<u>Letter No.</u>
Heye, Steve Central AR Group, Sierra Club	37	Osborn, Merrill, M. Individual	5
Hudson, Margaret S. Individual	33	Pearson, Charles Individual	11
Jones, Dale Individual	42	Phillips, Drew Audubon Soc. of Central AR	31
Jordan, Thurman Haas, Barry AR Audubon Society	46	Quattlebaum, Charlotte Individual	40
Keeton, Tennie Dale Individual	53	Rommel, Harmon L. Individual	30
Lee, John C. Individual	10	Riley, Thomas Entomology Dept., LSU	49
Lloyd, Roy Individual	54	Ross, Gary Individual	38
Lloyd, Sue Individual	57	Savage, Richard Individual	56
McMath, James B. Central AR Astronomical Soc.	4	Smith, Lula G. Individual	32
Miller, Andrew Individual	47	Talbert, Bill Individual	52
Morris, Tony Individual	26	Turnipseed, Glyn Individual	28
Mueller, Alan U.S. Fish & Wildlife Service	9	Vere, Victor K. Individual	35
Murray, Susan Individual	43	Westlake-McVay, Jo Individual	17
Myers, Trevor Vaughn, Jack Cloyes Gear Company	7	White, George Individual	19
		White, Jewell A. Individual	21

<u>Individuals</u>	<u>Letter No.</u>
White, Milton Individual	20
Wilks, Glenn Individual	55
Woodward, Fann J. Individual	6
Wright, Robert D. Individual	23
Wynne, B.J. U.S. Environmental Protection Agency (EPA)	61
Yandell, Bob Individual	8

Appendix G:

Part II - Alphabetical list of people and organizations
who gave oral presentations on the DEIS
at public meetings in Little Rock (M1) and Paris (M2)

<u>Individuals</u>	<u>Comment No.</u>	<u>Individual</u>	<u>Comment No.</u>
Davis, Charlotte Paris Rotary Club	M2-2	Rawlins, Jim Member of Sierra Club	M1-4
Flatte, John Individual	M2-5	Scoggin, Stewart Individual	M2-11
Gallagher, Matthew AR Herpetological Society	M2-6	Selman, Charles Individual	M2-8
Gordon, Richard, Jr. Public Awareness Comm., Inc.	M2-14	Stump, Mark Individual	M2-9
Grist, Bill Logan County Judge	M2-10	Trusty, Arthur Individual	M1-1
Hollis, Greg Individual	M2-1	Wade, R.N. "Butch" Individual	M1-3
Huber, Mark Alderman for City of Paris	M2-3	White, Jewell Individual	M2-12
Morris, Tony Individual	M1-5	Willems, Frank State Representative	M1-2, M2-16
Mueller, Allen U.S. Fish & Wildlife Service	M2-13	Williams, John Mt. Magazine Association	M2-4
Oliver, Rick Individual	M1-6		
Olsen, Keith Individual	M2-7		
Otmer, Gerald Individual	M2-15		
Paxton, Bill Individual	M1-7		

APPENDIX G:

Part III - Written Comments

RECEIVED

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: *Analysis is comprehensive. Everyone should find it an interesting accommo- dated. However, the study is abbreviated with the exhibit and resources at the VIC cover geologic origin, simultaneous variances in climate, why? Variations occur in top limestone sites, creek beds, Lower of Mida Springs (1880) (at Dripping Springs), Greenfield-Dining Room and Cabins 1930's where Senator Curaway lived, especially the evident- typical geology where numerous artifacts were Comments on Alternatives found near the indicated amphi- theater northeast of Signal Hill.*

How about planning a phased development with priorities, based upon current usage and ex- why? present wish for the future all based upon reasonable expectation of providing, initially, and later, as well as in second with indicated growth of usage?

Other Comments: *It seems particularly appropriate that educa- tional usage would include well-planned excursions into nature in at least the dining- why? sections from the park - perhaps along Clear Creek and from Cameron Bluff to Green Ranch.*

Name Garvin Green Organization _____
(First) (Mi) (Last)
Street 7811 Super Lane B-26 City Smith State AR Zip Code 72903

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

P. & D. Dist
RE: EIS Study
PARK _____ DIR. _____
REG _____ ENG. _____
FILE ✓ R.F. _____
INSP _____
PLNR Randy
OTHER _____ 82

RECEIVED
SEP 17 1992

ARK STATE PARKS

Response to Comments in Letter No. 1

From: Garvin Green

Comment No. _____ Response _____

- A. Development of the Visitor Information Center would include exhibits interpreting the cultural and natural history of Mt. Magazine.
- B. Phased development has been proposed. Appendix F of the EIS presents one potential development scenario.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

ARK STATE PARKS

P. & D. Dist.

Comments on Scientific Analysis:	
Why?	<p>A</p> <p>Comments on Alternatives: I'm in favor of Alternative B because of the effect on the flora and fauna of the mountain. It would increase the visitation but the top of the mountain would not be as disturbed as the other three (3) alternative C, D, and E. The amount of waste water generated by the three other alternatives concerns me and the possible affect it will have on the mountain. I'm not sure the occupancy rates of the other state park lodges would justify building another lodge any larger than the one proposed in Alt. B. The only site for the lodge is on the south side of mountain at the old site. The view of Blue Mountain Lake is breathtaking.</p> <p>B</p> <p>Why?</p> <p>C</p> <p>Other Comments:</p> <p>D</p> <p>Why?</p>
<p>Name <u>Becky L. Cahoon</u> Organization _____</p> <p>(First) (Mi) (Last)</p> <p>Street <u>Rt. 2, Box 28</u> City <u>Bluff</u> State <u>AR</u> Zip Code <u>71722</u></p>	

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Response to Comments in Letter No. 2From: Becky L. Cahoon

Comment No. _____ Response _____

- A. Your preference for Alternative B has been included in the content analysis of all comments received.
- B. See 28A for response.
- C. Your preference for constructing the new lodge at the old lodge site has been included in the content analysis of all comments received.
- D. Analysis of the potential effects of proposed development on sensitive species can be found in Section 4 of the EIS. Potential effects to these species will be a primary factor in determining the level and character of development on Mt. Magazine. This EIS will allow the selection of a development alternative compatible with the continued existence of PETS species.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

we have had all the studies we need to have done - It seemed to be a delay to the point with development of building.

Comments on Alternatives:

alt - D seems we give - > think we should preserve some, but I think we need looks. cobble, visitor center development is what more people want and need -

Other Comments:

I have seen this for a long time & I hope I live to go to see the development take place.

Name Emogene Tilman Clark Organization _____

(First) (Mi) (Last)

Street 1003 So. Cherry City Paris State Ariz Zip Code 72515

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

P. & D. Dist
RE:

PARK _____ DIR. _____
REG _____ ENG. _____
FILE ☒ R.F. _____
INSP _____ PLNR Randy
OTHER _____ 80

RECEIVED
SEP 22 1992
ARK STATE PARKS

Response to Comments in Letter No. 3

From: Emogene Tilman Clark

Comment No. _____

Response

A. Your preference for Alternative D has been included in the content analysis of all comments received.

THE CENTRAL ARKANSAS ASTRONOMICAL SOCIETY

P.O. BOX 38 ROLAND, AR 72135
372-1367

P. & D. Dist
RE: _____

PARK _____ DIR _____
REG _____ ENG _____
FILE ☒ R.F. _____
INSP _____
PLNR Randy
OTHER _____

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Sept. 18th, 1992

Re: Mount Magazine State Park

Dear Mr. Butts:

This is in response to your request for comments on the proposed plans for the Mount Magazine State Park. These comments are related to changes which would maximize its potential for recreational/educational astronomy, and preserve a dark sky as a part of the natural environment for the benefit and enjoyment of the Park's visitors.

There are approximately 35,000 "amateur astronomers", that is persons who belong to organized astronomy societies such as ours, in the Country. There are nearly ten times that number who subscribe to popular astronomy publications. More importantly, the majority of the population is intrigued by astronomy facts and events and respond eagerly to programming concerning these subjects. Almost everyone, who has had the experience, treasures the personal contact with the universe that is associated with experiencing a truly dark sky on a clear moonless night.

It is our group's feeling that a society in which the average person lacks exposure to or a basic comprehension of their Universe, is missing an important point of reference necessary to a proper personal and social perspective. This makes it important that persons have the opportunity to experience, first hand, the Universe as revealed in a dark clear sky.

However, with the constant encroachment of urban light pollution, fewer persons have an opportunity for such personal contact with the night Sky. Indeed, increasingly people are not even aware that they are missing anything. A large percentage of children growing up today have never seen a dark sky. I have enclosed a Satellite photo of North America showing the extent of the light pollution problem, which is effectively blanking out the night sky for urban and even near urban dwellers.

Response to Comments in Letter No. 4

From: James B. McMath, Central AR Astronomical Soc.

Comment No.	Response
A.	While astronomical areas are proposed under Alternatives D and E, no specific locations are indicated in the EIS. Your preference for the East End picnic area is noted.
B.	Your valuable comments on lighting are noted and for the most part will be considered in the final design phase. The text of the DEIS has been changed to reflect a commitment to the use of fully shielded lighting fixtures within the area of development.
C.	Tennis courts are not a component of the preferred alternative, Alternative D.

The proposed Magazine State Park could provide an important dark sky resource for the public to engage in astronomy related activities and programs and/or simply for providing the public an opportunity to view and experience a dark sky. While Mt. Magazine's elevation is of some value in this connection, its primary asset is its remoteness from urban development. Of equal consideration is the fact that its location, near the National Forest, gives a reasonable guarantee it will remain relatively unpolluted, assuming some care is taken with the selection and use of outdoor lighting during its development. Also of importance is the fact that despite its remoteness it is still reasonably accessible to many of the state's urban populations.

Promoting public interest, learning and participation in any area of natural science is a desirable goal for any entity with a public education role. Astronomy is the oldest of the sciences and draws upon all the others natural sciences. It is therefore potentially a powerful tool with which to generate greater popular interest in science in general. Our Society has been particularly interested in its potential for cultivating young people's interest in science and math, and we have developed school outing programs at our observatory for that purpose. It is feasible for there to be programs at the Park which would provide similar benefits. By having a single knowledgeable park ranger, the park could have astronomy related activities for the public with no additional resources than the naturally dark sky and a good Flashlight. Another approach is to associate with amateur groups who can put on programs, as our Society currently does at Pinnacle, Woolly Hollow, and Toltec Mound State Parks, and use to do on a larger scale at Petit Jean. However, such a park has value, even without any programming by simply offering the public an opportunity to experience a part of their natural environment which they are otherwise increasingly being shut off from.

In addition, our Society is already becoming concerned about how long the sky at our site will remain sufficiently dark for some activities. We anticipate that it may be necessary to locate alternate observing sites, such as Mt. Magazine, for such activities in the not too distant future. Though our thoughts in that regard have centered on a site in the Winona area of the National Forest nearer Little Rock, this is far from a certain decision. There is also a new society recently formed in the Russellville area, one in Hot Springs, one in Ft. Smith and I believe one of the colleges in the Russellville area has a limited astronomy program. Primarily because there are no locations which have both accommodations, and dark skies in close proximity, there are currently no large amateur astronomy gatherings in the State. Magazine, if properly developed, offers the potential of providing the necessary balance of facilities and remote dark sky. These groups represent a potential constituency for the Park and offer the possibility of various joint

ventures with the Park which might utilize its dark sky resources for education and recreation.

In short there is reason to believe that, especially in the long run, Magazine may prove to have substantial potential as an astronomical observing site for the public at many levels. This can range from simply providing campers with a dark sky over rustic camp sites; to setting up a do it yourself outdoor guide to the sky for the less initiated visitors; to having an area suitable for setting up portable scopes in a location where the horizon is reasonably clear, especially to the South; to periodic programs/star parties, and even formal observing facilities.

At the extreme of this spectrum, I have seen a wonderful facility located about thirty minutes East of Wichita Kansas, owned jointly by the city park service, the county, and a small college. This facility combines a permanent observatory which is available for education, research and recreational observing, with a area for portable scopes and a museum/auditorium area full of exhibits, computers, and active displays. I was there on a Friday and Saturday night as part of a seminar involving amateurs from across the country. The facility was full of youngsters engaged with the various activities offered. Such a facility offers educational, recreational, and tourism benefits.

However, the approach we are recommending, at this point, is to make a modest effort to facilitate astronomy activities at a base level, while taking steps to preserve a dark sky for the benefit of all the visitors as an essential part of the natural environment of the Park. Doing so will preserve this valuable dark sky asset for further development should the demand and other resource (volunteer effort) develop.

With the forgoing in mind we would suggest that the current physical concept, as it addresses astronomy, would not be appropriate. The hang gliding site is located to close to areas proposed for development. Further, the shear drop off poses a potential hazard for persons engaged in a night activity performed without benefit of lights, and will have an adverse effect on what is referred to as "seeing", which is deteriorated by turbulence in the air, compromising certain types of observing and especially those which the general public most enjoys at star parties, such as the planets and moon. Such a location would not likely be used for observing.

If there is electricity available, the East picnic area or a location adjacent there to, is the ideal site. No substantial development is required; only a relatively flat area with reasonably clear horizons, especially to the south. None of this should necessarily conflict with the picnic function. Although, if the picnic area is to be illuminated special care will need to be taken to

minimize its effect on the sky, by limiting its use, and proximity to the designated observing site and/or by providing a means to extinguish some or all such lighting were practicable, such as in pavilions. We would be happy to provide consultation with regard to particulars.

B

Anything beyond the foregoing is strictly optional, such as the sky guide alluded to above, which could permit novice visitors to find their way through the constellations. There are, of course, other things that could be done to enhance the use of the resource, both for the casual and dedicated observer. However, the one essential is that care be taken to limit light pollution through out the development process. I have enclosed some publication on proper lighting techniques put out by the International Dark Sky Association. The bottom line is that by using modern, efficient, fully shielded lighting fixtures in proper wattage's and in appropriate locations, you can provide necessary safety and security while maintaining esthetics and dark skies. You will also save enormously on power requirements. It literally is a no loose situation!

If one were considering a serious professional observatory location, LPS (low pressure sodium) fixtures would be a must. These are monochromatic (emit a very narrow wave length of light) and hence are easy to filter. They are also the most efficient. However, they are also the least available, and the most expensive to purchase. Further, do to the monochromatic aspect, they do not display color which, for some uses is a draw back, particularly in settings like parking lots and recreational areas where people need to be able to distinguish colors. The HPS (high pressure sodium) is the proper selection, at least in most location. Such fixtures offer most of the efficiency of LPS, are readily available, and produce an adequate band of light for color rendition. **Selective use of HPS lighting in appropriate wattage's, and always in *full cut off fixtures* will allow for adequate outdoor lighting, where necessary, without materially polluting the sky.** Using LPS in areas particularly close to observing sites may be worth while, depending on the circumstances.

C

Which brings us to the tennis courts. It seems a surprise, frankly, that there might be a big demand for tennis courts at such a Park. It certainly seems that there are enough of them in the cities, and strange that persons, in large numbers, would go to a rustic style park and expect to play tennis. There are also a number of parks which already offer these, such as Petit Jean. It should be noted, that one reason our Society quit going to that park, where we us to co-sponsor a number of star parties each year, was that the already less than perfect site was no darker than more convenient locations.

You will of course know better than we the demand for tennis facilities. Unlighted ones, of course, would be no draw back at all. However, for night use they would have to be flooded with a white light (metal halide probably). The likely effect will be to seriously compromise and perhaps destroy the value of the park for amateur astronomy, as well as the esthetic value of the park for campers, in so far as it relates to the ability to experience a dark sky in a rustic setting.

Granted, only a small percentage of the Park's visitors may consciously note its absence, but a truly dark sky over a camp site is one of the most rewarding aspect of a rustic camp setting. It is a pleasure often visited with surprise upon the unsoliciting occasional camper who happens to look up on a dark moonless night. It is an event which frequently marks the beginning of a more active interest in the sky, for those who are lucky enough to have the experience. Seeing Satellites, meteors, and the Milkyway can make an entire camping trip memorable. Unfortunately, there are far too few opportunities for most people to have such serendipitous experiences, and if every time we construct a rustic park with camping facilities we install lighted pools and tennis courts etc., it will become even more so. Placing such artificial barriers between the park visitor and a part of the natural environment, largely unavailable else where, seems inherently contrary to such a park's prime purpose, and certainly wastes a crucial asset.

It is this increasingly rare opportunity for personal contact with the universe which we would like to see preserved at the Park, for the average person if not the enthusiast. The beautiful thing is that it cost nothing to do so. It is an asset which will only grow in value over time, and one which the Park can cultivate in many different forms by selected development of facilities, either simple or grand and by developing liaisons with amateur groups and educational institutions. Lighted tennis courts can be put almost anywhere, dark skies cannot. This is the only proposed activity which would seem necessarily to conflict with preserving a dark sky for the Park.

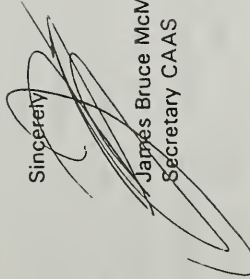
The following is a list of astronomy groups around the state excepting the new group in Russellville, which I can locate if you are interested.

Fayetteville: Astronomical Society of Northwest Arkansas, 2503 Sweetbriar Dr., 72703.
 Contact: Betty Davis, 442-2833.
 Fort Smith: Arkansas-Oklahoma Astronomical Society, P.O. Box 31, 72902.
 Contact: Joe Roam, 474-4740
 Hot Springs Village: Village Star Gazers, 13 Tarifa Lane, 71901
 Contact: Dorothy Kegerreis, 922-3068.
 Central Arkansas Astronomical Society, P.O.Box 38, Roland, 72135

Contact: Sky Line 372-1367, or Bruce McMath, 664-2662.
Texarkana: Red River Astronomy Club, 4808 Sunbury, 75502.
Contact: Ken White, phone 772-4200.

We trust that you will consider these observations in evaluating your plans. The only changes being urged are that you not light the tennis courts or other such outdoor facilities, follow good outdoor lighting practices, and provide some rudimentary location for portable scopes near the East Picnic area, or some other location with a southerly view located well away from the central area of development. Our Society would be happy to help you in any way to achieve these important results. We would also be happy to discuss possible ways to enhance the use of the dark sky resource which should exist at this Park. The dark sky could even be a theme item for such a park located on a significant elevation north of a large National Forest. If you have any questions Please do not hesitate to call me.

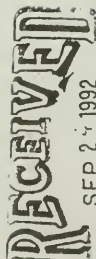
Sincerely



James Bruce McMath
Secretary CAAS

5

P. & D. Dist

RE: Mt. MagazinePARK _____REG _____FILE ✓INSP _____PLNR BeadyOTHER _____


SEP 24 1992

ARK STATE PARKS

23 Sept 1992

Merrill M. Osborn

11460 Southridge Dr.

Little Rock, AR 72212

Mr. Greg Butts,

I am writing you in response to the proposed development of a state park on mount magazine. I want to state that I'm strongly opposed to making part or all of Mt. Magazine a state park. I'm in favor of Alternative A, the no action plan. The U.S. Forest Service does a good job of managing the resources located atop the mountain and I think the plan should continue.

I think it is absurd to spend \$17,500,000 "to improve" the recreation potential of Mt. Magazine.

The draft EIS does not address what makes Mt. Magazine so unique and special. In its present condition, Mt. Magazine is still basically natural. Mans' handiwork is minimal. It is remote. Possibly you could consider it as almost wild. The natural beauty, wilderness, remoteness, etc makes mount Magazine very special. There are not many, if any, non developed locations like Mt. Magazine left in our great state. We have Pkitt-John, we have a multitude of other state parks, we have Corps of Engineer and Forest Service parks located across the state. We don't need another park. We need to leave Mt. Magazine alone. Let's let our future children see it as the natural thing of beauty it is now.

Response to Comments in Letter No. 5From: Merrill M. Osborn

Comment No.	Response
A.	Your preference for Alternative A has been included in the content analysis of all comments received.
B.	Your comments on the natural beauty, wildness, remoteness, etc. of Mt. Magazine are noted. The DEIS document addresses each of these areas that interest you, in the Executive Summary and in Section 3.0, The Effect of Environment. Also, the issue of aesthetics has been addressed in several portions of the document (Paragraphs 2.5.9, 3.12, 4.2.9, 4.3.9, 4.4.9, 4.5.9, and 4.6.9).
C.	Your comments are noted.

The draft EIS does not address the issue of changing the wilderness status of Mt. Mojave nor does it address the commercialism and commerce that will result from a \$17,500,000 state park. It will be just like Petit Jean Mt. To me this is more significant than writing (EIS) about plants, etc. That 99.99% of the people don't even know about. The building of more roads, more parking areas, more camp sites, more picnic areas, hotels, swimming pools, treatment plants, etc. will irreversibly change the nature of the top of Mount Mojave. It will become just another park that happens to be located atop Mt. Mojave. I guess you realize that people visit Mt. Mojave to get away from Petit Jean and places like it.

The development of a state park atop Mt. Mojave will alter the socioeconomic trends of the area --- or so the EIS would lead you to believe. I disagree. I think the socioeconomic impact will be immeasurable

regardless of the plan selected. I realize it (plan D) will provide a few jobs but it certainly won't alter any trends. Besides, who is so greedy that they would sacrifice the natural beauty of Mt. Mojave for a few dollars?

Part IV, page 7 of the draft EIS states, concerns and effects of alternatives (no action). I think that these concerns are grossly overstated. What ever is occurring now would continue to occur with plan D plus the mt. would

5

be spoiled by the proposed development.

The draft EIS is slanted toward the plan (plan D) that the State Parks and Tourism people, the local politicians, and others (who think they have a chance at monetary gain) want. The development of Mt. Magazine as a state park will destroy what is unique about it. It will become just another recreation area with a good view. We have enough of these places. We don't have any other Mt. Magazines.

Sincerely
Merrell M. Osborn

CF

Rob Kopack - U.S. Forest Service

RECEIVED
SEP 24 1992

ARK STATE PARKS

RE: Proposed Lodge and Cabins at Mt. Magazine

A Please design guest rooms to optimize views of Arkansas' unsurpassed scenery.

Examples of good parks design:

Lake Barkley, Ky. and other parks in the Land Between the Lakes. Outer walls are mostly glass, some with narrow decks outside with chairs, from which to enjoy the view.

Also parks facilities in Oklahoma, Virginia, West Virginia, to cite a few.

Bad examples:

Wilhelmina Lodge with the narrow slits in the corner of the room, or DeGray with such limited window space, no opportunity to move outside to relax, take in the fresh air and enjoy the view.

Arkansas has premium scenery, and guests in park lodges deserve a vista, not peepholes.

Please, let's not repeat the mistakes!!!!!!!

Fann J. Woodward
Fann J. Woodward
8209 Chatham Drive
Little Rock, Ar.
72207
501-225-3175

Response to Comments in Letter No. 6

From: Fann J. Woodward

Comment No.	Response
A.	Your preference for the design of guest rooms in the lodge has been noted. Thank you for your comments.

7



Gear Company
P O Box 528, Paris, Arkansas 72855. Phone 501-963-2105

Precision Timing Components

September 21, 1992

Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Attn: Mr. Greg Butts, Director

Dear Mr. Butts:

After reviewing the draft of the Environment Impact Statement for the proposed park on Mount Magazine, we are convinced that some development of this nature would certainly benefit our area.

In our opinion, Alternative D, as described in the Impact Statement, offers the best all-around proposal for our area. This option would provide both recreational and educational opportunities for area residents as well as visitors from neighboring states.

With tourism dollars so important to our economy in Arkansas, this option (Alternative D) would certainly be an asset for years to come.

Finally, with the meeting rooms and auditorium proposed by this option, we at Cloyes would certainly foresee vast usage for various sales meetings and training programs.

We definitely feel that the development under Alternative D would be most beneficial with the least environmental disturbance of the five options.

Sincerely,

CLOYES GEAR COMPANY

Trevor Myers
Trevor Myers
President

Jack Vaughn
Jack Vaughn
Vice President

P. & D. Dist. _____
RE: Not Magazine
PARK _____ DIR. _____
REG. _____ ENG. _____
FILE _____ R.F. _____
INSPECTION _____
PLNR Buddy _____
OTHER _____

JP

Response to Comments in Letter No. 7

From: Jack Vaughn

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.



Director Greg Butts

ARK STATE PARKS

I recently read in Ft. Smith SWTR paper of possible plans to build a State Park on Rt. Magazine. I'm a life long resident (41 years) of Ft. Smith and love my parents here from Jefferson County. I visited the old lodge on the mountain several times with great enjoyment.

My family and I love driving up to the top of the mountain every year or so and very much hope the plans for a State Park will go through. A carefully planned and maintained park and campground with rock ups could only increase the enjoyment of people who go to the mountain and should in no way detract from the natural beauty.

I will not be able to attend the Sept 29th meeting in Paris, but I hope to hear that these plans will soon become Arkansas' newest State Park.

Bob Yandell

Response to Comments in Letter No. 8

From: Bob Yandell

Comment No. _____ Response _____

A. Your support of State Park development is included in the content analysis for all comments received.

STATEMENT OF THE U.S. FISH AND WILDLIFE SERVICE
at the
MOUNT MAGAZINE PUBLIC HEARING
Parks, Arkansas
September 29, 1992

Good evening. I am Allan Mueller, field supervisor of the Fish and Wildlife Service's field office in Vicksburg, Mississippi. We have been working with the U.S. Forest Service and the Arkansas Department of Parks and Tourism and their consultants on the Mt. Magazine park proposal for several years. During our work we came to recognize that Mt. Magazine is very special, not only because of its historical and economic place in the local communities and its striking vistas, but also because of its unique biological communities.

Mt. Magazine is the home of over 45 rare species, mostly plants and invertebrates. While only one of these, the Mt. Magazine shagreen, a snail, is on the federal endangered species list, together they form a unique ecosystem that is the product of Mt. Magazine's long isolation from other similar habitats. In recognition of the unique biological value of this ecosystem the Service has designated the north rim and portions of the slope, the summit plateau, and Bear Hollow as Resource Category 1 habitat. This designation was made using the Fish and Wildlife Service's Mitigation Policy and means that we consider those areas as unique and irreplaceable on a national scale. This is not a regulatory designation. Its purpose is to advise potential developers of the unique value of the site and to guide the Fish and Wildlife Service in the recommendations that we make regarding any proposals in the area. Our planning goal for Resource Category 1 habitats is no loss of existing habitat values. This designation is not made lightly and it serves to demonstrate the high value that we place on this site. In this case, the presence of a rare Resource Category 1 habitat, if properly presented to the public through interpretive displays, could contribute in a positive way to the overall success of the park.

The proposed park design, Alternative D, has been very carefully and skillfully developed to provide a public park with a minimum of adverse impact to the mountain's unique living resources. However, in order to further minimize potential adverse effects to sensitive habitat, we recommend that the new lodge be constructed at the old lodge site, and that wastewater should be piped down to the 1,600 foot elevation. If the Bear Hollow lodge site is used without the piped discharge, the invertebrate community living in Bear Hollow, which is Resource Category 1 habitat, could be adversely impacted by the mountain top discharge of wastewater.

Because of the limited mountain top area, any development can be expected to cause some adverse impacts. Accordingly, we recommend that the 19th century homestead, which does not appear to be essential to the park's success, be deleted or reduced to the smallest possible size.

The staffs of the Forest Service, the Arkansas Department of Parks and Tourism, and their consultants have done a great job with this proposal and the environmental impact statement. If the operation of the park lives up to the quality of the park planning, the citizens of Arkansas should have an excellent facility for many years to come.

Thank you for the opportunity to make this statement.

Response to Comments in Letter No. 9

From: Alan Mueller, USFWS

Comment No.	Response
A.	Interpretation of Resource Category 1 habitat would be an integral part of the State Park's public education efforts.
B.	The Bear Hollow site for lodge construction has been eliminated from Alternative D. The lodge will be constructed at the historic lodge site. Effluent from the waste water facilities will be hard piped down to the 1,600 foot elevation before being released.
C.	Arkansas Department of Parks and Tourism feels the 19th century homestead would be an integral part of interpreting the rich cultural heritage of Mt. Magazine. Two potential locations (5 acres each) were surveyed to determine the potential effects resulting from construction of this facility. In response to your concerns about minimizing effects, it will be possible to limit this facility to two acres in size.

Response to Comments in Letter No. 10

From: John C. Lee

Comment No. _____ Response

September 26, 1992

Greg Butts
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72202

Dear Mr. Butts:

This letter is in response to the kind and location of the proposed facilities that are listed on the preferred alternative, alternative D, of the Draft Environmental Impact Statement (DEIS) of Mt. Magazine.


The changes that should be made to the preferred alternative, alternative D, are listed below:

- 1) The proposed lodge should have at the maximum forty rooms.
- 2) There should only be five cabins at maximum.
- 3) If the lodge is to be built, it should be placed at the alternative site on the preferred alternative.
- 4) The number of full facility campsites should be matched with an equal number primitive campsites that would support the low income guests.
- 5) Any fencing next to the cliff should be aesthetically pleasing and as far away from the cliff as possible.
- 6) The residence housing should be concentrated at the visitor center location.
- 7) If an amphitheater is to be placed there only needs to be one.

There is one parameter that was not covered in the DEIS. You should have consulted a qualified hydrogeologist. The thirty to forty acres of new pavement and foundations that are to be placed on top of the mountain will effect the amount of total watershed into the streams that run from the top of the mountain. Even just a small reduction of the amount of water that reaches these streams can wipe out an endemic species. Please announce this point that was left out of the DEIS to the rest of the members of the committee.

Please consider these terms.

Sincerely,



John C. Lee

RECEIVED
OCT 01 1992

ARK STATE PARKS

A. Your preference for changes to Alternative D has been noted, and has been included in the content analysis of all comments received. Please note, in Section 4.7 of the EIS, Mitigation Measures #24 and #27, which call for signs and fences for visitor protection as well as use of appropriate architecture and landscaping to minimize effect on aesthetics. Also, note the placement of a second amphitheater symbol at the lodge sites on Figure 2.4 was an error. This has been corrected. The text describing Alternative D development proposes only one amphitheater.

B. The EIS team included a qualified hydrogeologist who contributed to the analysis of impacts of park development on runoff, drainage, and endemic species off the mountain top. For this reason, these issues were adequately considered or covered. New pavement and foundations will reduce the amount of permeable area available for recharge to groundwater, which provides baseflow to some springs and streams on the mountaintop. However, the total area affected by construction, which includes new pavement and foundations, is 18.5 acres in the preferred development alternative. This small acreage represents less than one percent of the total mountaintop watershed, and therefore, less than one percent of the potential area available for recharge. Run-off from this area will be distributed among several discrete drainages or watersheds as it leaves the Mountain with no single watershed receiving a large amount of stormwater runoff. The projected increases in flow and sediment transport are projected to be small, do not represent a significant impact to any ecosystem component off the mountain top, and are generally within the ranges of the natural system. In particular, impacts to any endemic species are projected to be inconsequential. This especially includes the Magazine Mountain shagreen, which is a terrestrial species and should not be impacted by these changes. Moreover, park development will lead to small increases in runoff, not decreases as implied by your comments.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

I believe it is appropriate for the area.

Why? It, in my opinion, does not conflict with nature. (provided it's public use is supervised by responsible personnel.)

Comments on Alternatives:

I would suggest plan "D" since it would give access to a larger number of people.

Why? People from all walks of life would enjoy the beauty of Mt. Magazine.

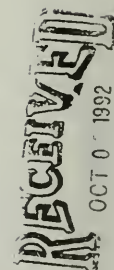
Other Comments: Much work has been put into this project for years by concerned citizens. I hope that construction will begin soon.

Why? It will help the economy in our area and be a beautiful place for recreational activity.

Name Chief Charles Pearson Organization Paris Police
(First) (Mi) (Last)
Street 1810 E. Walnut City Paris State Ar Zip Code 72855

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

Response to Comments in Letter No. 11

From: Charles Pearson

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.

COMMISSIONERS

Warren A. Thies, Chairman
 Fred Dacus
 Mari Hohnbaum
 Virgil L. Miller, Jr.
 Leon F. Williams

EXECUTIVE SECRETARY

Roy L. Bithell
 J. J. Bithell



MEMBER NATIONAL ASSOCIATION OF REAL ESTATE LICENSE LAW OFFICIALS

612 Summit Street
 Little Rock, Arkansas 72201-4740

TELEPHONE NUMBERS:

Licensing Department
 and Administration
 (501) 682-AREC (2732)
 Investigation Department
 (501) 682-2736
 FAX
 (501) 682-2729

SEP 23 1992

RECEIVED

September 23, 1992
 Typed September 30, 1992

Mr. Randy Roberson
 Department of Parks & Tourism
 1 Capitol Mall
 Room 4A-900
 Little Rock, Arkansas 72201

Subject: Comment Re: Mount Magazine

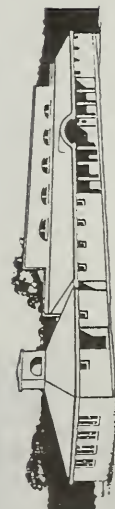
Dear Mr. Roberson:

We ask that you add our comments to information you are gathering about the proposal to build a lodge on Mount Magazine.

On reading the article about this in today's paper, we gather there is environmentalist objection to constructing a lodge and attendant facilities, expressed by rock climbers and Sierra Club members. While we recognize the need for preserving the environment, we firmly believe the construction of a modern facility will be positive. Not only will those devoted to enjoying "nature in the raw" be able to experience the joy of knowing Mount Magazine but also those of us who, for various reasons, are not inclined to, or able to, enjoy nature in the same way will be able to share their enjoyment.

We strongly encourage the development of new accommodations on Mount Magazine. While our personal interest is rooted in 50-year's-ago sentiment, we believe our personal experience illustrates the value of providing comfortable facilities for use by the general public.

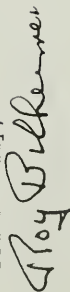
My wife and I spent a weekend honeymoon at Mount Magazine in 1942. We had come to know and love Mount Magazine on previous occasions when I was with my bride-to-be and her father for visits with my mother-in-law-to-be who, at that time, was a patient at the Booneville Sanatorium.



Mount Magazine was our introduction to Arkansas' natural beauty. There we began to experience the joy of exploring nature's wonders; the serenity and beauty to be found there and in other Arkansas settings. If we had not been introduced to the grandeur of Arkansas at Mount Magazine 50 years ago we might never have been motivated to experience the fulfillment found in so many other Arkansas locations -- Devil's Den, Fayetteville, Eureka Springs, Petite Jean, and more.

While details of these experiences are personal, it is pertinent to the issue now being considered for Mount Magazine. We strongly recommend the development of the facility being considered so that the general population will be able to experience the beauty and wonder of our state if facilities are available.

Yours truly,



Roy Bilheimer

RB/jj

CC: Representative Frank Willems

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

The study and preservation of nature is very important. However, I do not believe this plan is going to hinder it any.

Why? The plan is for people to be able to enjoy nature while still enjoying modern facilities. Many people love to walk in the fresh air and enjoy beautiful scenery, but want a hot meal and a warm bed when they are done. Some of us are just not the "roughing it" type.

Comments on Alternatives: I want to support Plan D as an Alternative. I believe it will provide enough different items to have something to interest just about anyone.

Why? The more items of interest we can provide, the more people we will be able to pull into the park. Where someone may not be interested in one of the items, they may be interested in one of the others.

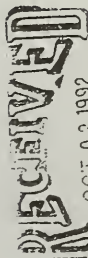
Other Comments: I believe this project will be a very positive thing for our area. Not only will it increase tourism, jobs, and our overall economy, but it will also provide a place for parents and teachers to take our children to teach them about the wonders of nature. Arkansas is the "natural state", and I can't think of a better way to show it off.

Why?

Name	Valorie J. Anderson	Organization	
(First) (Mi) (Last)		City	Paris
Street	1711 West Mary	State	AR
		Zip	Code 72855

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

Response to Comments in Letter No. 13

From: Valorie J. Anderson

Comment No. _____ Response

A. Your preference for Alternative D has been included in the content analysis of all comments received.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: *None*

Why? *All seem OK*

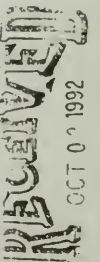
Comments on Alternatives: *Use Alternative C. Refuse shielded street lights so we not to pollute the night sky with glow*
Why? It gives plenty of park usage without overkill

Other Comments: *Astronomical site by bluff used for hang-gliding sounds dangerous when walking around at night without lights. The updraft winds are detrimental to open wings. Light is reflected and wings blurred*
Why?

Name *Carl J. Freyaldenhoven* Organization *Central Arkansas Astronomical Society*
(First) (Mi) (Last)
Street *14505 Ridgeland* City *Little Rock* State *AR* Zip Code *72211*

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



Response to Comments in Letter No. 14

From: Carl Freyaldenhoven

Comment No.	Response
A.	Your preference for Alternative C has been included in the content analysis of all comments received.
B.	Section 4.7 of the DEIS included measures to minimize light pollution. Mitigation Measure #22, which called for sodium arc lighting to minimize light pollution, has been amended to include shielded lighting.
C.	While alternatives D and E call for designated astronomical observation areas, no specific areas are proposed in this EIS. Your input regarding appropriate locations is welcomed.

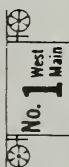
Response to Comments in Letter No. 15

From: Don Dunn

Comment No. _____ Response

A. Your preference for Alternative D has been included in the content analysis of all comments received.

DUNN INSURANCE AGENCY



NUMBER	DATE
ARKA	DD 09/30/92

Booneville, Arkansas 72827 Phone (501) 675-2400

Don A. Dunn
Home Phone 675-2400
Office Phone 675-2401

* MISCELLANEOUS MEMO *

Arkansas State Parks
Attn: Mt. Magazine EIS
#1 Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

To Mt. Magazine EIS

I have attended at least two hearings on the proposed development of Mt. Magazine. I've also read carefully the executive summary of the DEIS and I've scanned the DEIS. As a long-time resident of Booneville, I've been on the mountain many, many times. I strongly support Alternative D. I've camped in 8 states from Colorado to Tennessee and talked with campers in those campground who all acknowledge that Arkansas has as fine a Parks system as there is anywhere. Keep up the good work, continue to pursue Alternative D.

From Don Dunn

Don Dunn



— Since 1947 —

16

Response to Comments in Letter No. 16From: Sharon Conroy

Comment No. _____ Response _____

- A. Your preference for rebuilding a lodge and cabins to historic levels and characteristics has been included in the content analysis of all comments received.

<p><i>If I ever have to do with rebuilding the Lodge on Mt. Magazine, I'm absolutely for it. I remember Susan's last spending a lot time at Mt. Magazine Lodge and how wonderful it was. It would be so good for Logan and Jefferson Counties to have a short circuit to drive to spend a beautiful weekend or day at the Lodge or Cabins. It was so good for our community years ago. Why wouldn't it be a good move now? I'd like to see it rebuilt just like it was before, same style and same type.</i></p> <p><i>Sharon</i></p> <p>Other Comments:</p>		<p>Name <u>Sharon Conroy</u> Organization _____</p> <p>(First) (MI) (Last)</p> <p>Street <u>202 N. 5th St.</u> City <u>Paris</u> State <u>AR</u> Zip Code <u>72853</u></p>	
<p>Why?</p>		<p>Please fold and return this comment sheet to:</p> <p>ARK STATE PARKS OCT 1992</p> <p>Greg Butts, Director Arkansas State Parks One Capitol Mall Little Rock, AR 72201</p>	

A

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

My thanks to all for all the hard and detailed studies done.

Why?

Comments on Alternatives:

I agree with Alternative D as was presented last evening at a meeting in Paris, Ar.

Why? It would allow every kind of enjoyment of the mountain that is being done now, plus all of us that would like to enjoy an evening in the lodge or a week in the lodge or a cabin.

Other Comments:

I live on 309 just south of Paris, and although there will be an increase in traffic, we might see an improvement in our roads. Another thing the State Park will do for our Town and western Ar. is bring in Dollars, as we all know. I know you're spending money and our part of the state sure can use that and the new jobs that will be generated by the construction and running of the Park.

I hope it is started SOON.

Name Jo Westlake-McVay Organization _____
(First) (Mi) (Last)
Street Box 975 City Paris State Ar. Zip Code 72855

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

RECEIVED
OCT 05 1992

ARK STATE PARKS

Response to Comments in Letter No. 17

From: Jo Westlake-McVay

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: I feel that all the people involved in researching & compiling the DEIS did a fantastic job. It considers all concerns that I have heard mentioned & arrives at what I think is the best alternative.

Why?

Comments on Alternatives: I agree with the decision to propose Alternative D as the best plan of action

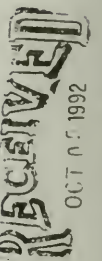
Why? Alternative D does the most good for the most people with the least amount of disturbance to the environment.

Other Comments: I have utilized & absorbed the beauty of Mount Magazine nearly all my life. With this development, many more people will have the opportunity to experience this Mountain. Thanks for allowing the people of Logan County, Why? the chance to share our pride & joy with the rest of this Country.

Name David L. Corbett Organization Wade Insurance Agency
(First) (MI) (Last)
Street 605 N 5th City Paris State AR Zip Code 72855

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



Response to Comments in Letter No. 18

From: David Corbett

Comment No. _____ Response _____

- A. Your preference for Alternative D has been included in the content analysis of all comments received.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

Seems thorough for the purposes considered.

Why? Plenty of room for Animal life and some development.

Comments on Alternatives: Plan D. seems to be a very workable plan.

Why? Meets the needs of most people.

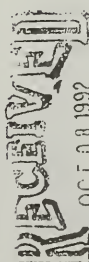
Other Comments: Would like to see this plan started in near future.

Why? Not only for pleasure, but the economy could use the boost.

Name George M White Organization _____
(First) (Mi) (Last)
Street 2708 E. Walnut City Paris, State Ar. Zip Code 72855

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

Response to Comments in Letter No. 19

From: George White

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

Seems quite adequate for the area. I see no conflict with nature and developing a facility for public use.

Why?

Comments on Alternatives: I would like to indorce Plan D as an Alternatie plan for meeting the needs of more people.

Why? This plan will allow people of many interest to enjoy the mountain areas.

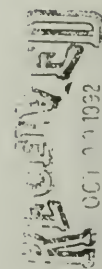
Other Comments: This project has taken a very long time, with every aspect being studied so thoroughly I am encouraged to think that we will see action soon.

Why? Not only will this provide a place for recreational activity, but it will also boost the economy for the area.

Name Milton White Organization _____
(First) (Mi) (Last)
Street 503 So. 7 City Paris, State Ar. Zip Code 72855

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

Response to Comments in Letter No. 20

From: Milton White

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

Seems quite adequate for the area. I see no conflict with nature and developing a facility for public use.

Why? I think the space is adequate for development and other activities as well.

Comments on Alternatives: I would like to indorce Plan D as an Alternate plan for meeting the needs of more people.

Why? This plan will allow people of many interest to enjoy the mountain areas.

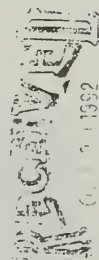
Other Comments: This project has taken a very long time, with every aspect being studied so thoroughly I am encouraged to think that we will see action soon.

Why? Not only will this provide a place for recreational activity, but it will also boost the economy for the area.

Name Jewell A. White Organization City Of Paris
(First) (Mi) (Last)
Street 503 So. 7 City Paris, State Ar. Zip Code 72855

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

Response to Comments in Letter No. 21

From: Jewell A. White

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.

Please discuss w/me by Wed. 6/18/92. Thanks Stan
These - please draft reply, covering items 1-10, by 10/10
Randy

Mr. Richard A. Gordon, Jr., President
 Public Awareness Committee, Inc.
 1145 North 57th Place
 Fort Smith, Arkansas 72904
 (501) 452-0086
 October 7, 1992

PLANNING & DEVELOPMENT

OCT 12 1992

RECEIVED

RE: Mount Magazine State Park--Draft Environmental Impact Statement for Proposed Park--Public Meeting, Paris, 9-29-92

Mr. Greg Butts, Director
 Arkansas State Parks
 One Capitol Mall
 Little Rock, AR 72201

Dear Mr. Butts:

We would like to thank the Arkansas Department of Parks and Tourism and the U.S. Forest Service, Ozark-St. Francis National Forests, for all of the kindness they have shown us. Also, a special thanks goes to all the people who worked so hard on the preparation of the DEIS.

As I stated in Paris, our Directors are made up of elected county and city officials, educators at all levels, a cross section of professional people, etc., who are not all located in Fort Smith. We are a non-partisan corporation dedicated to the improvement of the quality of life of all the people. We appreciate the remarks of Senator Bumpers. A copy of his letter is attached.

We have briefed the county judge, the mayor and the city board of directors of the City of Fort Smith, as well as the Fort Smith A and P Commission. It is a pleasure working with these individuals. We have furnished information to the Chamber of Commerce and other individuals and organizations.

The following are our comments:

- A** 1. We agree 100 percent with the statement of the U.S. Fish and Wildlife Service. A copy of this statement is attached.
- B** 2. We would like to know what scientific study and research projects are planned and would like public input into these projects where appropriate according to law.
- C** 3. We desire to be on the mailing list of all projects that are affected by NEPA in the Ozark-St. Francis National Forests.
- D** 4. Educational/interpretive programs--we would like input into the formulation of these programs, along with the general public.
- E** 5. Environmental monitoring by the Arkansas Department of Parks and Tourism, U.S. Forest Service, and other agencies. (Please list which federal, state and county agencies.) We would like input into the formulation of this monitoring policy, along with the general public.

Response to Comments in Letter No. 22

From: Richard Gordon, Jr.

Comment No. Response

- A.** Your support of the U.S. Fish and Wildlife Services statement has been included in the content analysis of all comments received.
- B.** You will be notified of future opportunities for public input regarding scientific study/research as provided by applicable laws.
- C.** You have been placed on the mailing list for all projects in the Ozark-St. Francis National Forests falling under NEPA guidelines.
- D.** We welcome public input in developing educational programs.
- E.** The U.S. Forest Service is ultimately responsible for management and monitoring of resources on Mt. Magazine. At such time as Arkansas State Parks assumes management responsibilities on top of Mt. Magazine, a number of monitoring activities will be carried out by State Park staff. The Arkansas Game and Fish Commission, Arkansas Natural Heritage Commission, and the U.S. Fish and Wildlife Service are among those which currently monitor resources on top of the mountain. Your input into the formulation of future monitoring policy will be solicited as provided by applicable laws and conventions.
- F.** Arkansas State Parks has powers to establish policies, rules, and regulations on lands it manages (A.C.A. Sec. 22-4-104). State law enforcement staff are graduates of an accredited law enforcement program and will cooperate with U.S. Forest Service and Arkansas Game and Fish Commission officers in enforcing applicable policies, rules, and regulations.
- G.** We agree.
- H.** Please refer to the response to this concern voiced by the U.S. Fish and Wildlife Service (Comment #9).
- I.** Research will continue on the rufous-crowned sparrow. Availability of published research will be announced.
- J.** Copies of the FEIS will be made available to all interested parties.

F 6. We are pleased about on-site, full-time enforcement personnel. We would like more information on training, authority, etc. that these enforcement personnel will have.

G 7. For environmental reasons, the new lodge should be constructed at the old lodge site.

H 8. There is a question about whether the 19th century homestead should be deleted because of environmental reasons and costs.

I 9. Continuous research should be done on the rufous-crowned sparrow. We would like copies of this research.

J 10. Please furnish four copies of FEIS and public statements, along with the Forest Service decision.

We would like to visit with you and/or Richard Davies in person in Fort Smith about this project and any other projects under the control of the Arkansas Department of Parks and Tourism. If we can be of any help to your department in getting information out to the public, please do not hesitate to call on us.

We have a very open county and city government, as well as A and P Commission, where anyone may speak on any subject under the citizen forum. Should you or Richard desire to speak at any of these governmental meetings, I would be more than happy to accompany you.

The next formal meeting of the Public Awareness Committee will be Thursday, December 3, 1992, when we will honor the outstanding students at Westark Community College with a reception starting at 2:30 p.m. in Room 102, in the Holt Building at Westark, with a business meeting following. We would be very pleased if you and Richard could attend. Please notify me if you and Richard will be able to attend.

Sincerely yours,

Richard A. Gordon
Richard A. Gordon, Jr.
President

Copy: Senator Bumpers
Senator Pryor
Representative Hammerschmidt
Governor Bill Clinton
Mr. F. Dale Robertson
Judge Harper
Mayor Baker
Commissioner Hamilton
Director McAlpin
Lynn C. Neff
Dr. Barnes
Dr. Gordon
Dr. Harper
Dr. Owen
Mr. Mitchell
Mrs. Dillard

Robert D. Wright
68 Crestview Road
Conway, AR 72032
October 9, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Please accept these comments on the draft EIS for Mount Magazine State Park. It is my understanding that Alternative D is the proposed alternative.

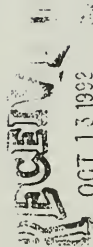
A How will it be possible to adequately protect sensitive sites with such development? The plan does provide for designating as off limits considerable acreage that includes sensitive sites, but the distance between these sites and intensively developed areas cannot be great, given space limits on the mountain. The most appealing sensitive sites, such as the maple-leaf oak, very small sphagnum bogs, rocky balds near cliff edges, and elfin forests, will attract visitation in spite of being declared protected. No amount of signage, or even concealment by absence of signage, will keep visitors away from highly appealing sites such as these, and it is most unlikely that park personnel will be able to effectively patrol against abuse of sensitive sites.

B I urge that development no greater than the level described in Alternatives B or C be undertaken. The enhancements for scientific study and education in Alternative C are attractive. This would mean, in all probability, not only that fewer people used the park, but that users would tend to be more sensitive to the natural features. Those looking only for hardened recreation sites would, and should, go elsewhere. The park should feature not hardened recreation sites such as tennis courts and swimming pools, but the scenic beauty at overlooks and along trails. Cove Lake is available nearby for swimming. This is one of the premier beauty spots of the state, and I heartily approve of giving it state park status to increase public accessibility. But commercializing the mountain to the extent involved in Alternative D is neither necessary nor desirable. All other things being equal, it would be all right to have a park that employed more people and paid its own way, but that does not justify exposing this exquisite place to the pressures Alternative D would create.

Sincerely,

Robert D. Wright

Robert D. Wright
Professor of Biology (retired)
University of Central Arkansas



ARK STATE PARKS

Response to Comments in Letter No. 23

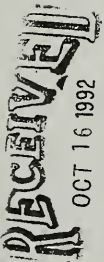
From: Robert D. Wright

Comment No.

Response

A. It is the position of Arkansas Department of Parks and Tourism that proper visitor management is possible. Granted, signage and/or concealment alone will not protect sensitive sites. However when combined with education of the public, we feel there is sufficient evidence that adequate protection is possible. The U.S. Forest Service and the National Park Service have documented success in protecting sensitive sites using combinations of education, proper signage, rerouting access, establishing restricted areas, etc. Effects of increased park use are discussed in Section 4 of the DEIS. With mitigation, no adverse effects to sensitive sites is expected.

B. Your preference for Alternatives B or C has been included in the content analysis of all comments received.



RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on Scientific Analysis. DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

Why?

Comments on Alternatives: Executive Summary- Section B, paragraph 1 of Alternative A (No-Action) states: "A decrease in income, earnings & labor force, an increase in unemployment" would occur under this alternative.

Why? Is this accurate?

I recommend revision to this statement to indicate that no economic growth would occur under alternative A, as opposed to the current draft which implicates a decrease in socio-economic status would occur. In this instance, a no-action plan would not decrease "present conditions".

Other Comments:

Why?

Name KEN BAZZELL Organization ASWCC
(First) (Mi) (Last)
Street 151 E. CALHOUN ST. 350 City LITTLE ROCK State AR Zip Code 72201

Please fold and return this comment sheet to:
Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Response to Comments in Letter No. 24

From: Ken Brazil

Comment No. _____ Response _____

A. We believe the statement is accurate and reflects the ongoing trends. For an ease of understanding, though, we have changed "A decrease in income, earnings and labor force; an increase in unemployment..." to read "A growth in income, earnings and labor force; an increase in unemployment would occur under this alternative."

Response to Comments in Letter No. 25

From: Matt Gallagher, AR Herpetological Society

Comment No.	Response
-------------	----------

A.	The purpose of management indicator species is to enable the determination of the extent or magnitude of impacts from a proposed or implemented alternative. To accomplish this any species selected must meet certain criteria including: 1) population densities which allow evaluation, and 2) data which identify critical limiting factors (i.e., food, habitat needs for cover, reproduction, and water needs). Unless this information is available, the ability to determine effects due to an alternative cannot be separated from non-alternative induced effects (i.e., natural variability).
----	--

Although several species are present in restricted habitats, the overall impact due to alternative selection could not be evaluated based on species with restricted habitat requirements, and to monitor a host of species is, unfortunately, both invasive to the species and logistically impracticable. Also, an evaluation species should allow evaluation of both ecological and social importance.

B.	Before construction of any wastewater treatment facilities at the site, a State of Arkansas Construction Permit will be required from the Arkansas Department of Pollution Control and Ecology (ADPCE). In this process the ADPCE will review the design calculations and detailed plans and specifications for wastewater treatment facilities including the collection system. Detailed considerations such as the need to construct a holding basin or tank will be addressed in this process. It is not common for a newly constructed collection system to experience significant amounts of inflow and infiltration during wet weather conditions, and we would not anticipate wet weather flows to be significantly different from dry weather flows.
----	--

The majority of the wastewater collection system proposed for Mt. Magazine will be a pressure system as opposed to a typical gravity system. Thus, the amount of infiltration and inflow into the system will be less than for a typical gravity wastewater collection system. The utilization of this type of system, combined with the fact that not all the water utilized on the Mountain will enter the wastewater treatment system (e.g., irrigation flows), means that < 100% of the water used on the Mountain will be treated by the wastewater treatment plant. The calculations used in this analysis to determine wastewater flows (i.e., water use of 20,900 gpd X .8 = 16,700 gpd wastewater flows) are reasonable and valid.

The 16,700 gpd wastewater flow takes into account seasonal water use and demand patterns and is presented as an average daily flow. The calculations of minimum and maximum wastewater flows will be necessary during the final design of the wastewater treatment plant. If additional wastewater storage

Matthew E. Gallagher
Arkansas Herpetological Society
Rt. 2, Box 240 B
Russellville, AR 72801

October 13, 1992

Lynn C. Neff
Forest Supervisor
Ozark - St. Francis National Forests
P.O. Box 1008
Russellville, AR 72801

Dear Sir:

As President and acting Conservation Chair for the Arkansas Herpetological Society, I have been commissioned to address the Mount Magazine State Park Draft Environmental Impact Statement (DEIS). Copies of this letter are also being sent to the Director of Arkansas State Parks and the State Parks Resource Management Specialist.

In preface to the comments contained in this letter, I would like to make it clear that the Society does not oppose the State Park. Our major concern is that the DEIS has not been performed as well as it should have been in some areas, possibly in response to political pressure. We ask that these areas of concern be reexamined and that the EIS merely be performed correctly before any development should occur.

The first concern that the Society would care to voice is in the choice of management indicator species and the treatment thereof. While the black bear, white-tailed deer, and wild turkey are excellent indicators of effects on the macrovertebrate populations, they give no information on the probable effects on microvertebrates or the invertebrates.

Response to Comments in Letter No. 25 (Continued)

From: Matt Gallagher, AR Herpetological Society

Comment No.	Response
	<p>capacity is deemed necessary at that time, several options were identified (e.g., including a wastewater flow equalization basin in the wastewater treatment facility) that would allow the cost estimates and the environmental consequences in this EIS to remain valid. Given these factors, a 20,000 gpd wastewater treatment facility is judged to be adequate for Alternative D.</p> <p>The wastewater treatment facilities will also require a National Pollutant Discharge Elimination System (NPDES) permit for its discharge. Any NPDES permit issued for wastewater treatment facilities will be required to maintain the State of Arkansas' Surface Water Quality Standards (Regulation No. 2 of the ADPCE). These permit limitations will be set so that, pursuant to Regulation No. 2, all Designated Uses and Protective Criteria for the receiving waterbodies are maintained. Nutrient loadings tied to waterbody uses will be considered in this process.</p> <p>There will be increases in flow and nutrient loading off the mountain top following park development, but these are not expected to impact xeric forest communities in the West Bass Creek drainage to any measurable degree. Flow and nutrient increases will be distributed among existing channels of the drainage system.</p> <p>There is no expectation that will be generally distributed across the forest floor. There is, thus, no reason to expect that there will be any impact whatsoever, due to either nutrients or moisture, on existing xeric forest communities in the specified drainage.</p> <p>C. The listings on the referenced table were identified in an article in the 1989 Newsletter of the Arkansas Herpetological Society. A citation for this source has been added to the FEIS. The comments regarding Table C-3 are appreciated, and the table has been corrected to reflect the comments where appropriate.</p> <p>In early 1991, FTN personnel contacted the Society's Curator, Dr. Glyn Turnipseed, regarding the possibility of reviewing records which the society maintained and to request permission to utilize that information in the evaluation. During that conversation it was apparent the records were considered the property of the Arkansas Herpetological Society (AHS) solely and a comment of "why should we assist your firm without compensation" was made. Furthermore, a comment was made that "the Society has no intention of providing their records". As a result of this telephone conversation it was apparent the AHS had no</p>

These latter two groups inhabit the mountain in much greater density than the chosen indicators and are also much more susceptible to changes in the environment. The DEIS reasons that low population density of the indicator species will lead to little or no effect on those populations. It appears as though the indicators were intentionally chosen to show that no ill effects would occur from development. While this may not be true, the total ignoring of the microvertebrates and invertebrates certainly substantiates this conclusion. We ask that additional consideration be given to these two groups by examining several appropriate species as management indicators.

B

Our next concern is with the wastewater treatment facilities. In Appendix F, the consulting engineer states in several instances that the estimated discharge from the sewage treatment facility could range from 10,000 to 30,000 gallons per day. Section 4.5.1.2 of the DEIS clearly states that the discharge would be approximately 16,700 gallons per day. After consulting with Mr. Stephen Gann, a licensed Class IV wastewater operator and Engineer-in-Training, it would appear that the 10,000 to 30,000 gallon number is a realistic value. However, two problems not even considered in the DEIS are that of surge volumes during periods of heavy visitation i.e. holiday weekends and the discrepancy between water usage and estimated discharges. It is highly likely that without a surge holdup capacity the treatment facility would be overtaxed and raw sewage would be released during heavy use periods. A rule

Response to Comments in Letter No. 25 (Continued)

From: Matt Gallagher, AR Herpetological Society

Comment No.	Response
	intention of working "with the researchers" without compensation and further attempts to request assistance from the Society were not made.
D.	Field surveys were not restricted to the period of July - August. Field surveys were also conducted in December, February, March, and May. While it may have been desirable to expend long periods of time on the mountain top in an attempt to compile a complete list of herpetofauna, time and financial constraints prevented that luxury. It is unfortunate that the researchers did not receive input from the Arkansas Herpetological Society, because those records would have made information in the DEIS more complete.
E.	Ecosystem size varies by its components. The social part of the ecosystem includes those counties or parts of counties in which the effects of a given project are identifiable. Likewise, the project affects the biological community of the mountain, as opposed to that of a 5-county area. Surveys and studies deal with the affected environment - not that environment reasonably beyond the reach of the effects.
F.	The potential increase in traffic may or may not result in increased roadway mortalities. However, State Parks and Forest Service can and are (as you point out) taking steps to minimize traffic-induced losses. One of the missions of the proposed state park is to provide naturalist and interpretive programs. A knowledge of the Mountain's species can only be increased in association with those activities.

of thumb used for estimating discharge volumes is that discharge should equal water usage in dry seasons and may exceed usage in wet seasons. Using the estimated water usage as outlined for Alternative D in Appendix F Part III, the discharge would be approximately 21,000 gpd. This would appear to make the 20,000 gpd treatment facility designated for Alternative D inadequate. Our last concern in the area of wastewater is that inadequate consideration has gone into the effects of the changes to be wrought on the West Bass Creek Drainage by the addition of a year round flow and nutrient loading. The current xeric communities (oak-hickory and shortleaf pine-hardwood) may be drastically altered by both increased moisture and nutrient loading in a typically low soil nutrient area.

The biological survey performed for the DEIS is of particular interest to the Society. If the sections concerning the herpetofauna are any indication, the biological survey was poorly done at best, with the possible exceptions of the botanical and insect surveys. The most blatant evidence of the inadequacy of the herpetofaunal survey can be seen in Appendix C Part II Table C.3. This table contains a supposed listing of reptiles and amphibians from Mount Magazine with the Society listed as an information source for two-thirds of the listings even though no citation is given for this source in the references. This is understandable considering the fact that none of our collection data has ever been published to place it in the public domain nor has it been personally related to

23

anyone for use in a publication. It is true that FTN personnel did contact us concerning our records but they improperly assumed that we were working for them and demanded that we turn over our information. While the Society would have been glad to work with the researchers, we were never approached except when we were virtually ordered to surrender our data. The aforementioned table contains many errors which would have been obvious to a herpetologist. These errors are so numerous and ridiculous as to completely destroy any credibility in the survey. Perhaps the best example of this is a listing, attributed to FTN, for the Southern Hognose snake. While this does not appear outwardly unusual to the casual reader, knowledgeable persons in the field would recognize this as a species that comes no closer to Arkansas than extreme southern Mississippi. It is quite obvious that whoever performed the herpetofaunal survey had not even a basic understanding of the common species to be found in Arkansas.

D

The overall design and performance of the field biological survey appears to have been biased against the amphibian portion of the herpetofauna. The field reconnaissance of the mountain was performed in the months of July and August, the hottest and driest time of the year. In addition, the site surveys ignored the December through February period which we have found to be quite productive for amphibian collecting. In many instances the only way to find certain salamanders is to locate them while migrating to and from breeding pools or while active in streams for breeding purposes. These

activities typically occur in late fall or winter whenever a heavy warm rain occurs. If these periods were avoided it is quite understandable why a common organism such as the spotted salamander would be omitted from Table C.3. We can only surmise that this same ineptitude exists throughout the biological survey and that the entire study should be closely examined prior to development.

F The last concern we have involves an apparent contradiction. According to current Forest Service policy, management is supposed to be handled on an ecosystem basis. The overall message of the DEIS is that no effects will be felt outside the 2200 acre park area as though that area will be excluded from the larger ecosystem to which it belongs.

When economic impacts are discussed, a five county area is considered. We believe that at least as large an area should be studied for environmental impacts. No thought is given to the fact that only a single road crosses the mountain and that the predicted five-fold increase in visitors will all have to cover this narrow corridor. This increased traffic flow can only increase the likelihood of animals being killed on the road. The Forest Service, at least, has already recognized this fact and the Society has been approached to aid in a project for construction of drift fences in areas of migration in order that the organisms might be channeled into culverts under the highways. The Society is requesting that additional research be performed on the entire ecosystem of which Mount Magazine is only a small part prior to any development.

I would like to reiterate that the Herpetological Society is not opposed to the State Park. We are, however, greatly concerned that the Environmental Impact Statement be performed in such a manner as to cover all possible or probable impacts within the ecosystem.

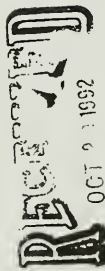
Sincerely,

Matthew E. Gallagher
Arkansas Herpetological Society

Response to Comments in Letter No. 26

From: Tony Morris

September 25, 1992



Mr. Gregg Butts
Arkansas State Parks
One Capital Mall
Little Rock, Ar 72201

Dear Mr. Butts:

I am writing in regards to the Draft Environmental Impact Statement dated August 1992 for the proposed Mount Magazine State Park. My comments fall into two categories, the first concerns the technical aspects of the Draft E.I.S., the second category addresses the preferred level of development.

I must admit that I am not particularly adept at critically reviewing documents of this nature. However, my educational background is in environmental geology and I have had over ten years experience in the field of hydrogeology. The draft E.I.S. states repeatedly that the recharge area for springs on the north side of the mountain is "located largely in the restricted area west of Browns Spring". This statement is made without supporting documentation or scientific basis.

In order to predict the impact of as much as 30 acres of development on spring discharge, the hydrogeology of the springs must be understood. There are two types of springs on the mountain, contact springs and structurally controlled springs. Contact springs are formed by a relatively permeable (hydraulically conductive) geologic unit overlying a less permeable unit. In places where erosion has exposed the less permeable unit, springs and seeps occur. Structurally controlled springs are found where secondary porosity features (such as faults or extensional fractures) intersect an erosional surface.

It is important to note that most named springs are located on the north side of the mountain. This is primarily due to geologic structure. The syncline which forms the mountain is not symmetrical, the interbedded sandstones and shales strike roughly east-west and dip to the north at 2 to 4 degrees. Water enters the shallow ground water system on the flatter portions of the mountain, movement occurs along bedding planes and joints within the sandstones and shales and flow is primarily to the north. The recharge areas for particular springs can only be determined by potentiometric data derived from piezometers. The affects on the springs, of as much as 30 acres of development in which storm water is shed rapidly, was not adequately addressed. This information is important since the springs and seeps are key components of plant and animal habitat, and a significant amount of recharge apparently occurs on the south rim of the plateau.

Comment No. Response

A. The installation of expensive piezometers to determine the configuration of the potentiometric surface and hence the direction of groundwater flow and the recharge areas for individual springs was beyond the scope of this EIS. In the absence of potentiometric data, statements about springs and the groundwater resources of Mt. Magazine were based on existing data regarding the geology, physiography, soils, and climate of the Mountain, with field verification where possible. As the commenter has stated, water enters the shallow groundwater system on the flatter portions of the Mountain and moves down dip along bedding planes and joints within the sandstone and shale and discharges to contact and structurally controlled springs on the north face of the Mountain.

The flattest area on the Mountain, which is the area with the thickest soils and the area with the greatest potential for groundwater recharge, extends from Cameron Bluff to the west end of the Mountain. This area is believed to be the recharge area for Brown's Spring and other named springs on the north side of the Mountain. The restricted area on Mossback Ridge is probably a recharge area for unnamed springs on the east end of the Mountain. No development has been proposed in these important recharge areas. Furthermore, 18.5 acres of development under the preferred alternative represents less than one percent of the total mountaintop watershed and less than one percent of the potential area available for recharge. In addition, the proposed development is not concentrated in any single, discrete hydrologic sub-basin that may function as a recharge area for any given spring. The actual amount of infiltration to the shallow groundwater system from any storm event is a function of storm intensity, soil permeability and thickness, slope of the land surface, and amount of vegetation present. All of these factors are quite variable on Mt. Magazine.

B. The presence of park development on the mountain does not preclude the use of fire in controlling vegetation although manual methods are often just as effective as fire. Active management of vegetation through the use of carefully controlled prescribed burning and/or mechanical removal will be used to maintain glade and woodland communities, along with any component sensitive species.

C. Your preference to construct the lodge at the alternative lodge site has been included in the content analysis of all comments received. Please note, the U.S. Fish and Wildlife Service recommends constructing the new lodge at the old lodge site. The Service believes constructing the lodge at the alternative location presents greater potential for adverse effects to sensitive habitat.

Response to Comments in Letter No. 26 (Continued)

From: Tony Morris	
Comment No.	Response
D.	Your suggestions for changes to Alternative D have been included in the content analysis of all comments received. Please note, the placement of a second amphitheater symbol at the lodge sites in Figure 2.4 was an error. This has been corrected. The text describing Alternative D development proposes only one amphitheater. Also note, in Section 4.7 of the EIS, Mitigation Measures #24 and #27 call for signs and fences for visitor protection as well as use of appropriate architecture and landscaping to minimize effect on aesthetics.

Page 2

B The preferred development location under Alternative D is the historic lodge site. This area is occupied by several fire dependant plant and animal communities. The commercial development will adversely impact these communities since fire will no longer control successional species.

In order to lessen the impact on this sensitive area, it would seem prudent to limit the size and scope of development in this area or move the commercial development to the alternate location on the east end of the mountain.

C It is obvious that the alternate lodge site on the east end of the mountain would cause the least ecological harm. However, if the commercial complex is to be built on the south face of the mountain, please consider the following comments. These suggestions would lessen the damage to sensitive plant and animal communities.

- D**
- A 40 room hotel rather than 60 rooms.
 - 5 cabins rather than 15.
 - Eliminate the 1800's farm or move it to the pine plantation on the east end of the mountain.

- Primitive camping should be provided for visitors of modest means, at a nominal charge or free of charge. These camp sites should provide only sanitary facilities and possibly a central water source and should be located away from highly developed areas and recreational vehicle parks.

- One amphitheater rather than two, and located in the Cameron Bluff Campground area or in the visitor center area.

- Move the Waste Water Plant from the south slope to the visitor center area.

- Move all employee housing to the visitor center area.

- Fencing along the south slope of the mountain should be unobtrusive. It should be of native stone and in close proximity to the lodge. Please do not use chain link.

- Signs to encourage visitors not to throw objects from the cliffs, since this activity threatens the safety of climbers and hikers below.

I thank you for this opportunity to express my opinion regarding this unique tract of public land. I feel that there are presently sufficient opportunities for developed recreation at existing mountain top resorts. Mount Nebo is located approximately 20 miles northeast of Magazine and is a mountain top state park with many of

Page 3

the same type facilities proposed for this park. Petit Jean State Park is located roughly 40 miles east of Magazine and is an intensely commercialized state park which would directly compete with this development economically. Commercial development of public resources which possess exceptional aesthetic value, such as Mount Magazine, is unfortunate. Particularly for those of us who have enjoyed the mountain in its present natural state for many years.

Cordially,

Tony Morris, P.G.
Professional Geologist Registration No. 22

PLANNING & DEVELOPMENT
OCT 2, 1992
Arkansas Natural Heritage Commission
323 CENTER STREET
LITTLE ROCK, ARKANSAS 72201
Phone: (501) 324-9150



Harold K. Grimmelt
Director

Bill Clinton
Governor

October 12, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, Arkansas 72201

ARK STATE PARKS

Re: Proposed Magazine Mountain State Park

Dear Mr. Butts:

Thank you for the opportunity to comment on the DEIS for the proposed Magazine Mountain State Park. I believe it is sufficiently comprehensive in most respects. However, several particulars caught my attention.

I assume that developing a new park would require considerable construction of roads and upgrading of existing roads along with the laying of utility lines of four types--all on the mountaintop. I did not find this work and its effects discussed.

The DEIS includes some good discussion of fire in terms of both the damage that wild fires can cause and the fire dependence of certain valued species and communities on the mountain. The present discussion serves mostly to discredit Alternative A, the No Action Alternative, (p. 7 and pp. 4-2 through 4-5). It is pointed out on p. 8 that alternatives B through E will facilitate control of fire, and the point is reiterated (as regards Alternative B) on p. 4-16. Nowhere, however, does the DEIS suggest that, under alternatives B through E, State Parks employees might undertake active management of vegetation--by prescribed burning, mechanical removal, or a combination of the two--for the sake of maintaining communities like the grassy glades and species (like the rufous-crowned sparrow, broom nailwort, and small-headed pipewort) that inhabit the glades. Adding such material could strengthen the DEIS.

On p. 4-5, the second paragraph seems to suggest that western wall flower (*Erysimum capitatum*) and maple-leaf oak (*Quercus shumardii* var. *acerifolia*) are "associated with mesic communities having light to heavy shade." On the contrary, the wall flower grows in full or partial sunlight, and its habitats are generally

Response to Comments in Letter No. 27

From: Harold Grimmelt, AR Natural Heritage Commission

Comment No. Response

- A. Where possible, road construction will follow and use a substantial amount of the existing road corridors, however, the existing roads are not wide enough to meet state park design requirements necessitating road expansion in these disturbed corridors. A minimal amount of "new" road construction (See Appendix F, pg. F-38) will occur on the mountaintop and the effects of construction (i.e., facilities, parking, roads) are addressed collectively for each location of development under each alternative. The majority of "new" road construction will take place off the Mountain for the construction of the water line access road. The effects of the water line access road are addressed in Chapter 4.0. Utility lines will follow road rights-of-way. Any siltation resulting from these activities has been addressed under the Soil sections for each alternative. The text has been changed to reflect your concerns.
- B. Your comments are noted and have been used in text revision in the DEIS.
- C. Scattered plants of western wallflower occur in open xeric woodlands on the extreme west end of the mountain. The largest populations and largest plants, though, are found in mesic communities having light to medium shade along and just below the bluffline at the extreme northwest end of the Mountain.
- D. Your comments have been noted and used in clarification of text in the FEIS in Paragraph 4.5.2.2.
- E. Given the concern over effects to sensitive species on top of Mt. Magazine, Arkansas State Parks feels it is fair to provide no more than four residences for park staff under Alternative D. This is consistent with the number of residences provided for other facilities of comparable size.
- Car-pooling is a fuel saving alternative which is practiced at other parks including Mt. Nebo. Please note an additional Mitigation Measure in Section 4.7, indicating car-pooling will be encouraged. Unfortunately, inclement weather does have the potential to disrupt certain aspects of park operation. However, the staff housed on top of the mountain would likely be able to operate park facilities during such conditions.
- F. Please refer to the response to this concern voiced by the U.S. Fish and Wildlife Service (Comment #9).

xeric. The vegetative succession that would probably progress under Alternative A would tend to eliminate the wall flower's habitat. Maple-leaf oak also thrives in xeric habitats with full sun, as well as in more mesic, shaded habitats.

The assertion on p. 4-38 that "No adverse effects on the vegetation are expected to occur from recreational activities under this (D) alternative," is quite sweeping. I would think there would be effects, even if only insignificant ones. Surprisingly, another statement later in the same paragraph seems to contradict the topic sentence: "As the number of visitors to the Mountain increases, direct and indirect effects on the plant communities are also expected to increase." It is unclear to me how the plant communities can be affected if the vegetation will not. If these two statements can, in fact, be reconciled, perhaps it would help to reword them.

I hope you will reconsider the number of employee residences to be built on the mountaintop. It appears that, under the preferred alternative, as many as 20 employees would have to drive up and down the mountain every day. To minimize the amount of fuel consumed in commuting, it would be desirable to house close to their work as many of the permanent staff as possible. Furthermore, inclement weather could disrupt the park's operation severely if too many of the employees lived down below.

The "19th century homestead" called for in the preferred alternative seems to me an unnecessary intrusion at this location. I would think such a feature would be much more appropriate as an enhancement of the Ozark Folk Center at Mountain View.

I failed to find a demand analysis to justify the lodging facilities that would be provided under the preferred alternative. It would be sad indeed if overbuilding/low rates of occupancy prevented the facilities from being operated on at least a break-even basis.

Concerning mitigation for the Diana fritillary (p. 4-57), why not take the further step of propagating the host plant in greater abundance? It is an easy one to grow.

Finally, (re Table C.3) Bill Shepherd of my staff assures me that he has encountered rattlesnakes on the mountaintop on at least two occasions. Let's not leave any of the mountain's attractions unrecognized!

Sincerely,

Harold K. Grimmett

Harold K. Grimmett
Director
Arkansas Natural Heritage Commission

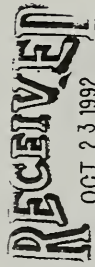
Response to Comments in Letter No. 27 (Continued)

From: Harold Grimmett, AR Natural Heritage Commission

Comment No.	Response
G.	<p>Demand analysis for the proposed facility is described in Appendix E, Part II, while analysis of revenues and costs appears in Appendix E, Part III. The 1973 CPS demand analysis study was based upon population projections that are still valid. If anything, they are understated. The transportation system, also part of the CPS demand analysis, is improved.</p> <p>This demand analysis does not address effects to similar facilities including Petit Jean, Mt. Nebo, and Queen Wilhelmina. The demand analysis is based solely on the effect upon a proposed Mt. Magazine state park. There has been much growth in the potential market area identified in the CPA study with respect to population and income. At the same time there has not been any increase in mountaintop resorts that we could identify. In the past, the lodges at Queen Wilhelmina, Mt. Nebo, and Petit Jean have been booked to capacity and therefore forced to turn customers away. This would indicate that the demand analysis is probably correct.</p> <p>Your comments on propagation of the Diana fritillary's food plants have been noted and will be considered in a separate Resource Management Plan for Mt. Magazine State Park.</p>

I. Table C.3 has been revised to include the western diamond-backed rattlesnake on the basis of information provided in greater detail by Bill Shepherd. Although its actual presence in the affected areas has not been documented by collection, its presence on the mountain should be and is now recorded.

Glyn Turnipseed
418 North Fairbanks
Russellville, AR 72801
October 18, 1992



ARK STATE PARKS

Lynn C. Neff
Forest Supervisor
USDA Forest Service
Ozark National Forest
Russellville, Arkansas 72801

Dear Mr. Neff,

I write this letter out of sincere concern for our natural state and its abundant resources. My name is Glyn Turnipseed. I am a Ph.D. biologist in my twenty seventh year of teaching about our natural world. I am also past president and current editor of the Arkansas Herpetological Society. I have not only taught for almost twenty seven years, but also studied the environment around me, performed research projects in this area, and written Environmental Information Document's (EID's) and Environmental Impact Statement's (EIS's) on numerous occasions.

Never before have I seen the near total lack of concern for our environment as with the Draft Environmental Impact Statement (DEIS) for Mount Magazine. This document appears to be an attempt to fit the environment to the EIS that is desired. It also appears to be an effort to place a state park on Mount Magazine regardless of the environmental impact to the mountain and surrounding area.

I think that with the availability of knowledge, expertise, and accessibility to this area, there is no excuse for the lack of consideration for the Mount Magazine area.

How can seemingly intelligent professionals come to a decision about an EIS that includes the top of a mountain and not also consider that water flows down hill? Are we going to build a berm around the 2200 acres and process all water from the top? Will Arkansas Department of Pollution Control and Ecology (ADPC&E) allow this? What happens with all of the outfalls off the mountain? Is this water out of sight and out of mind? With the clean water act and the relatively new National Pollutant Discharge Elimination System (NPDES) permitting, how are you going to justify the discharge of storm water from this much surface and its concomitant activities? What will the impact of the obvious pH changes that will occur in the water of each outfall have? How will the increase of a proposed five fold traffic flow effect these outfalls? What organisms in the outfalls and drains will be affected?

With all of the literature on acid rain and the decline of amphibians in our world, how could an EIS ignore this all important parameter of storm water? The statements concerning storm water on page 4-12 that essentially ignore any environmental effect from storm water from the top of the mountain have to be from stupidity.

Response to Comments in Letter No. 28

From: Glyn Turnipseed

Comment No. Response

A.

Stormwater flows generated from the site will be managed in accordance with all applicable regulations (see Response #61 K). As such, facilities and/or operations discharging stormwaters from areas of industrial and construction activities are required to make applications for coverage under the National Pollutant Discharge Elimination System (NPDES) regulations as administered by the Arkansas Department of Pollution Control and Ecology (ADPCE). Construction activities at the site will be conducted pursuant to the provisions of the authorized NPDES program of the ADPCE and any permits issued under this program. At this time stormwater discharges from other activities planned at the site (which are essentially commercial) are not required to be permitted under the NPDES program.

The EIS included a careful analysis of the possible effects of stormwater runoff from the top of the Mountain and found them to be inconsequential. The area to be developed under the preferred alternative represents only a small fraction (less than one 1 %) of the total mountain top area. Run-off from this area will be distributed among several discrete drainages or watersheds as it leaves the Mountain; no single watershed will receive a large amount of stormwater run-off. The projected increases in flow and sediment transport are projected to be small, do not represent a significant impact to any ecosystem component off the mountain top, and are generally within the ranges of the natural system.

NPDES permitting has been in place since the mid 1970's and is designed to permit and monitor discharges from discrete outfalls. Currently, only one permitted outfall (for discharges from the wastewater treatment facility) is anticipated as a result of activities associated with any alternative except Alternative A, and as stated, the receiving stream will be West Bass Creek. The pH changes are not obvious as a result of activities or developments. As stated in several places throughout the DEIS, based on watershed boundaries, no more than 10% of the stormwater runoff from any given sub-basin will originate from areas where which development activities have occurred. Currently, the potential increase in traffic is not likely to have a measurable influence on stormwater as stated in the discussion of each alternatives section on water.

Those organisms present in the unnamed tributary to West Bass Creek, into which the effluent will flow, will be affected. This tributary, however, is but one of a multitude of gully washes on the south side of Mt. Magazine. The continuous discharge of treated wastewater may limit some species but will also benefit others.

I am not against a state park on Mount Magazine. If anything I would encourage a park as a cooperating steward of a very special place in our natural world. I am against careless use of our environment. This DEIS causes the placement of a state park on Mount Magazine to be dangerous to the area and its organisms. There are numerous sensitive organisms on this mountain. The assessment of these organisms was not properly addressed. As a matter of statement in the DEIS there were many mistakes as to the identification of organisms that exist on the mountain not to mention the organisms that were omitted from the lists.

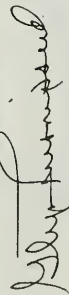
C

An environmental impact statement should be just what it says. I believe a definition of environment should be the world in which we live. We live in one world, not many compartments. Yes, there are many compartments, many smaller systems that may be considered. These smaller systems are connected and therefore the impact on our environment and its organisms must be considered as a whole and not a smaller part.

D

I submit this letter with the sincerest desire to do what is best for that special place in Arkansas known as Mount Magazine. It is the highest point between the Appalachian Mountains and the Rocky Mountains. It still holds many secrets about our natural heritage. In the words of Shakespeare, "In nature's world of infinite secrecy a little I can read." I, for one, would love to continue to read in nature's secrecy of Mount Magazine. I would also like to think that this could be conserved for generations to come.

With sincerest concern,



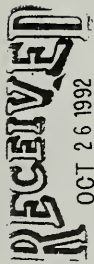
Glyn Turnipseed

cc: Randy Roberson
Greg Butts

Response to Comments in Letter No. 28 (Continue)

From: Glyn Turnipseed

Comment No.	Response
B.	The small increases in stormwater have nothing at all to do with acid rain and world-wide reductions in amphibian populations. There is no evidence that development of the proposed park will cause pH reductions in water leaving the mountain top. In reviewing page 4-12 of the DEIS, we find no statements that reference stormwater. For that reason your comment cannot be addressed.
C.	There were no organisms omitted which were observed during field studies or where published documentation could be obtained. Organisms which could potentially be found on the Mountain or those species which had been identified as occurring on the Mountain by individuals or organizations which chose not to provide that information could not be included.
D.	We appreciate your observation, and since you have participated in the development of numerous EIS and EA documents, you understand that limits have to be established to delineate evaluation boundaries. Surveys and studies deal with the affected environment - not that environment reasonably beyond the reach of the effects. The effects on the biological communities of the Mountain are addressed in the context of an area in which those effects can be identified. To include the "world in which we live" is beyond the bounds of this EIS.



RESPONSE FORM

ARK STATE PARKS

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: There seems to have been more than adequate time and effort put in on studying the area.

Why? To insure environment is protected and also the people of the area can enjoy recreational facilities.

Comments on Alternatives: I support the plan D. This plan seems to be the one that could accommodate the most people and still leave space for wild habitat.

Why? Considering the amount of room on top of Mt. Magazine, there should be enough space.

Other Comments: I have lived in this area a lifetime, I have seen no improvements, also Facilities for activities, I much prefer the later.

Why? People enjoy the area, the economy is also helped.

Name Helen Harris Organization _____
 (First) (Mi) (Last)
 Street 104 So. 7 City Paris, State AR Zip Code 72855

Please fold and return this comment sheet to:
 Greg Butts, Director
 Arkansas State Parks
 One Capitol Mall
 Little Rock, AR 72201

Response to Comments in Letter No. 29

From: Helen Harris

Comment No. _____ Response

- A. Your preference for Alternative D has been included in the content analysis of all comments received.

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

I have NONE. I've looked this entire EIS over and will admit that it is MUCH TOO TECHNICAL for anyone but a "Trained Forest Service" individual to begin to understand.

Why?

See the attached "Copy" of an article which appeared in the NW Arkansas Times of September 23, 1992 concerning a Similar Report on Beaver Lake, in which Alex Haynes of Eureka Spring voiced my own attitude toward your Report---INCOMPREHENSIBLE!

Comments on Alternatives:

I will choose the Alternatives chosen by the Forest Service, for they probably know what they care to do about all this. DO NOT TURN THIS INTO AN "ATV" PLAYGROUND. NOR a sort of Country Carnival type operation, either. NOR A DAMNED THEME PARK, EITHER!

Why?

Just keep the Cost as low as possible and still do the right things atop Mt. Magazine!

Other Comments:

Keep Mt. Magazine as nearly "Pristine" as it has always been. I ate dinner several times in the old Hotel there. I have a good friend up here in Springdale, who was born there. His Mother's Family was one of the original German Families settling there nearly in the 19th Century and spoken of in books by Frederick Gerstaecker, WILD SPORTS IN THE FAR WEST, 1876 and his Second book WESTERN LANDS AND WESTERN WATERS, London, 1864.

Name HARMON L. REMMEL Organization RETIRED, PRIVATE INDIVIDUAL
(First) (Mi) (Last)
Street 625 Crest Drive, Fayetteville City _____ State ARK Zip Code 72701-3719

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

RECEIVED Nov. 2, 1992

RECEIVED
OCT 26 1992

ARK STATE DADKCS

Response to Comments in Letter No. 30

From: HARMON L. REMMEL

Comment No. _____ Response

- A. Your preferences have been noted. Both the U.S. Forest Service and Arkansas State Parks wish to retain the sensitive resources and primitive characteristics which make Mt. Magazine a desirable recreation area.

MMB

Audubon Society of Central Arkansas

Response to Comments in Letter No. 31

From: Drew Phillips, Audubon Society of Central Arkansas

Comment No.	Response
-------------	----------

October 25, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, Arkansas 72201

Re: Proposed Magazine Mountain State Park

Dear Mr. Butts,

The Board of Directors of the Audubon Society of Central Arkansas voted to endorse Alternative A, the No Action, No Change Alternative, described in the DEIS for the proposed Mt. Magazine State Park. The Board based their decision on two major factors, environmental and financial.

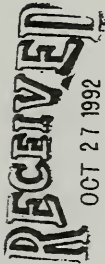
The DEIS assumes that the presence of Park Staff in Alternatives B thru E will result in less destruction by visitors to the mountain due to increased enforcement of rules and regulations. While this would be a benefit of increased development, we believe the gains in supervision will be more than offset by construction of trails, roads, the lodge and living and maintenance facilities for Park Staff. When you add the increased traffic of visitors to the mountain to the damage by construction activities there can only be more adverse impact to the environment with development of the park than Alternative A.

The Board questions the wisdom of investing millions of dollars in development of a new State Park, when the financial needs of existing State Parks are more pressing. Many of our existing State Parks are understaffed and dire need of funds to implement programs to realize their full potential as State Parks. Many existing structures in these parks are sorely in need of repair and improvement. Thus, there is a definite need in several of our existing State Parks for new facilities to better serve the public.

There is no guarantee that the lodge and other facilities will break even financially much less generate a profit. Also there seems to be no consideration to the financial impact to our other State Parks with similar existing facilities. We fail to see the demand by the public for this lodge.

The Audubon Society of Central Arkansas strongly urges you to put the needs of the entire Arkansas State Parks system ahead of the development of a new state park. The construction of the new park and it's longterm operation

ARK STATE PARKS

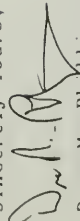


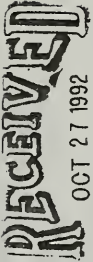
A. Your preference for Alternative A has been included in the content analysis of all comments received.

B. Demand analysis and profit projected for the proposed facilities is described in Appendix E, parts II and III. The methods used are accepted by professional economists. As with most proposed developments, there are no guarantees. The effect of this proposed park on existing facilities is dependent to a large degree on the support of the public and the state legislature. With proper funding, no existing park will suffer as a consequence of developing Mt. Magazine State Park.

could very well drain funds from existing parks making their operation more difficult than it already is. We believe in the long run the No Action, No Change Alternative will be more beneficial to the environment than any of the other Alternatives. Therefore, we again urge you adopt Alternative A, the No Action, No Change Alternative for Mt. Magazine.

Sincerely Yours,


Drew M. Phillips
President



RESPONSE FORM

ARK STATE PARKS

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: There seems to have been more than adequate time and effort put in on studying the area.

Why? To insure environment is protected and also the people of the area can enjoy recreational facilities.

Comments on Alternatives: I support the plan D. This plan seems to be the one that could accommodate the most people and still leave space for wild Habitat.

Why? Considering the amount of room on top of Mt. Magazine, there should be enough space.

Other Comments: I have lived in this area a lifetime, I have seen no improvements, also Facilities for activities, I much prefer the later.

Why? People enjoy the area, the economy is also helped.

Name <u>Lula G. Smith</u>	Organization _____
Street <u>502 So. 7</u>	City <u>Paris,</u> State <u>AR.</u> Zip Code <u>72855</u>

Please fold and return this comment sheet to: Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Response to Comments in Letter No. 32

From: Lula G. Smith

Comment No. _____ Response

A. Your preference for Alternative D has been included in the content analysis of all comments received.

RECEIVED
OCT 29 1992

RESPONSE FORM

ARK STATE PARKS

Response to Comments in Letter No. 33

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

From: Margaret S. Hudson

Comment No. _____ Response _____

- A. Your preference for Alternative D has been included in the content analysis of all comments received.
- B. Please see Paragraph 4.3.6 of the document. Federal standards and policies discourage the reconstruction of historic structures to the exact blueprint. A compilation of all information on these structures would be part of the mitigation plan if new buildings are constructed on the old lodge site.

Comments on Scientific Analysis:

I am very much impressed with the analysis of the affected environment and the wide range of information (PETS) that is included in the draft of the Environmental Impact Statement. So much research has been shown for the protection of the above. As our awareness of the importance for their protection grows, this must be a priority.

Comments on Alternatives:

I am in favor of Alternative D.

Why?

I believe this is the alternative that will allow the environment to co-exist with nature to the maximum to the benefit of both.

Other Comments:

I have suggested that research be made into the old CCC records of construction and used as a guide for building new or restoring other facilities.

Why? To contribute to preservation of cultural heritage.

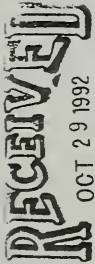
Name Roswell S. Hudson Organization Arkansas Department of the Interior
(First) (Last)
Street 1121 E. 23rd St. City Paris State AR Zip Code 72455

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall

Little Rock, AR 72201

I am most impressed with the proposed to develop park in your scientific study. I believe this will allow the development to be an addition to the Arkansas State Parks, will allow for the protection of the surrounding area, the benefit of the future generations, and the surrounding area.



RESPONSE FORM

ARK STATE PARKS

Response to Comments in Letter No. 34From: George and Elizabeth Fink

Comment No. _____ Response _____

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

<p>Comments on Scientific Analysis: <i>The Environmental Impact Statement is very good. It has information for anyone wanting to do research on Mt. Magazine the people who were lying back in the early 1900's was a part of the country. It also said about my going back to their relatives in Utah. Why? We have many friends & Co-workers from Texas A&T University who come through this country every year. We have a class to visit gear mt's landmark spring every year. We have a need people as we can see as more due to our position & work than in the mountain.</i></p> <p>Comments on Alternatives: <i>George & I prefer Alternative D. We recently visited Owen Williamson mt. The lodge there was beautiful and the scenery was beautiful. And mt. Magazine was also beautiful this weekend & great facilities would be good for the area.</i></p> <p>Why? <i>Many people were enjoying the scenery yesterday 15 or 20 cars at a time at the old lodge. When we are happy that so much work has been done and sure many from yell co. missed the meeting about 3 grave sites of the company shed & alternative D report to friends at the yell co historical meeting & the yell county teachers meeting the month I gave one to Rufus Owen, Kathryn Rippe of the teachers group and one to Ellen Morley (of Ballville) & the Why? <i>Historical group let each member of this group look at it. Jim broke of the spout in wildlife said Elizabeth Fink Our choice would be his choice.</i></i></p>	
Name <u>George B. Fink</u>	Organization <u>Yell Co. Retired Teachers</u>
(First) (Mi) (Last)	<u>Yell Co. Historical Society</u>
Street <u>RT 1 Box 935</u>	City <u>Dardanelle</u> State <u>AR</u> Zip Code <u>72834</u>

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

A. Your preference for Alternative D has been included in the content analysis of all comments received.



ARKANSAS TECH UNIVERSITY • School of Physical and Life Sciences

October 29, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

RECEIVED
OCT 30 1992

ARK STATE PARKS

Dear Mr. Butts:

With reference to the recent Draft EIS, for the Mount Magazine State Park, I should like to make several comments concerning alternative D, the "Preferred Alternative". These comments could, of course, be carried over to the other alternatives, except A. The numbers of the comments are keyed to the provisions as outlined on pages 2-15 through 2-17 of the EIS.

A 1) With reference to "camp units", could it be possible to provide some less developed (more primitive units) at a lower cost than the "Class A" units proposed? There are many people who would like to utilize the mountain for camping who cannot afford the cost of Class A units, namely the young rock climbers and hang gliders. In addition, there are those of us who enjoy Magazine for its quiet and solitude and would like to camp away from the "Winnabago Tribe".

B 7) I would hope that with reference to "designated recreational use areas," that they are not restricted as shown on the map on page 2-16, for, especially with reference to rock climbing, there are other suitable areas that have been and are being utilized. These areas include part of the south side cliffs, just west of the proposed lodge for a few hundred yards. In addition, the area from the proposed lodge east to the present overlook (just east of East End Picnic Area) on Rt. 309, should be designated as a climbing region. Although most of the north cliffs on the mountain are not suitable for climbing, one area just off the loop road that goes around the Cameron Bluff camping area is very good. I have indicated these areas (in red) on the enclosed map. I would hate to see areas placed "off limits" not utilized, just because they were not designated as particular use areas in the original plans.

C 16) With reference to utility services, especially water and sewage, the construction of a water pipeline up the mountain to support the extensive lodge would severely affect any of the ecosystems that it would traverse. In addition, has any thought been given to the effect of prodigious amounts of sewage effluent (from the treatment plant) on the ecosystem below the top - on the slopes of the mountain? I have stressed in

Response to Comments in Letter No. 35

From: Victor K. Vere

Comment No. _____ Response

- A. Your comment regarding the provision of primitive camping units provided under alternative D has been included in the content analysis of all comments received.
- B. The facilities and features shown on the Alternative D map on page 2-16 (Figure 2.4) are not drawn to scale. The intent in showing a designated rock climbing area was to indicate that this activity would be allowed in the area currently utilized on the south face of the mountain. For administrative and environmental reasons, other suitable areas are not being considered at this time. This does not preclude the assessment of alternative sites in the future.
- C. Under Alternative D the water line would be installed along an existing utility right-of-way the vegetation of which has already experienced disturbance and exists in a successional stage of development. There are no known elements, either individual species or terrestrial or aquatic communities, that would be adversely impacted by discharge of effluent from the sewage treatment facilities.
- D. Your comment concerning a permit system for scientific study has been noted. A reasonable system is anticipated.
- E. The restricted use areas proposed under Alternatives D and E are intended to serve as reserves and will not be open to the general public. Arkansas State Parks and the U.S. Forest Service feel this is a reasonable mitigating measure in response to the increase in visitation and access expected for other areas of the mountain.

previous letters (1989) that the Mt. Magazine environment is a very fragile one, and a major disruption as caused by the water line construction and sewage effluent could be very harmful.

- 19) It is hoped that the permit system for scientific study/research will continue to be a reasonable one that encourages the use of this natural feature (the mountain environment) as an outdoor laboratory. The uniqueness of this environment in Arkansas should be appreciated and not ignored in the rush to develop a "tourist attraction".

- 24) The designated restricted use areas, especially the western one-half of the mountain (west of Brown Springs), should be left open to foot traffic, for it contains the most beautiful areas on the mountain. When I had originally pushed for the road west of Brown Springs to be gated, it was my intention to cut down on casual automobile traffic, but to not restrict foot travel and hiking access, although I do not advocate a trail system there, but would prefer to leave it undeveloped. Let's try to leave some of the mountain in a semi-natural state.

It is hoped these comments will help to call attention to modifications that can benefit all those who use the mountain. For one who has enjoyed the mountain for over 16 years in all seasons, I regret that it will probably be developed to the extent proposed in the EIS, but I am hopeful that the development will be in the best interest of the mountain, and not just the businessman.

Very sincerely yours,

Victor K. Vere

Victor K. Vere
Professor of Geology

VKV:jdh

CERTIFIED MAIL P 402 328 232-
RETURN RECEIPT REQUESTED

October 27, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

RE: Proposed Mount Magazine State Park, Logan County, Arkansas
Draft Environmental Impact Statement (DEIS)
DEIS No. 920367

RECEIVED
OCT 30 1992

ARK STATE PARKS

On September 18, 1992, the Environmental Protection Agency published a notice of availability for draft EIS No. 920367 (see Federal Register 57, 43226). The following response is provided in accordance with the National Environmental Policy Act (see Federal Register 57, September 18, 1992, 43201).

The DEIS Executive Summary, III. Affected Environment, pages 6 & 7, states, "Average weekly earnings in manufacturing employment, construction, transportation and public utilities and finance, insurance, and real estate are less than the state average. Labor force participation rate is lower than expected because of low employment opportunities. The overall economic health of the study area is reflected in the long distances workers commute, often leaving the county of residence, to obtain employment."

A 3.0 The Affected Environment, 3.10.6 Unemployment and Commuting Patterns, page 3-52, states, "To obtain employment, a potential worker is faced with leaving the county of residence and seeking employment opportunities elsewhere. The percent of workers commuting more than one hour to their place of employment is high."

Comment: The DEIS fails to address the anticipated commuting times of potential park employees drawn from the five county economic area (see DEIS para 3.10.6). It is unclear what relevance commuting distances have with the Mount Magazine DEIS as proposed. Additionally, under DEIS alternative D, park management and staff are to be provided living quarters and residences on-site.

Comment: Flawed arguments for or against local commuting distances and travel times cease to be germane when describing the natural environment, and the areas effected or created by the various alternatives considered under the DEIS. In accordance with EIS standard formatting requirements under 40 CFR part 1502.15 such non-succinct socioeconomic arguments are not factors of consideration. Recommend that all employee commuting data be removed from the DEIS, and that all economic considerations for alternatives A-E that are based solely or in part upon such data be removed.

B 3.0 The Affected Environment, 3.10.1 Economic Area, page 3-34. The Mt. Magazine State Park area of primary economic impact is Logan County and Yell County, Arkansas (Figure 3.4).

Comment: No justification was given for excluding Sebastian County, Arkansas from the area of economic impact. Highway 10 provides the population of Logan County, Arkansas their most direct route to Highway 71 and direct access to the area's largest metropolitan area Ft. Smith, Arkansas. The economic and statistical analyses presented in the DEIS fails to provide a complete socioeconomic picture of the area.

Response to Comments in Letter No. 36

From: David E. Brown

Comment No. Response

A. What we were trying to indicate was the fact that the individuals in the area were very hard working and responsible persons who would commute significant distances for employment. Any employment opportunities, such as the development of Mt. Magazine, would be beneficial to the local population and the economy in general.

B. We did not feel that justification was needed for excluding Sebastian County, Arkansas from the economic base study. This is an economic impact study of Mt. Magazine and not an economic impact study of population centers from where visitors originate.

C. The DEIS was prepared before 1992 projections of county unemployment rates were released and, in fact, before much of the detailed 1990 census data was available. The 1980 projects were used specifically as explained in the DEIS to be comparable with other projected figures that were presented. The 1980-89 unemployment rates were presented as part of the historical record. These data are not intended to be either a "pessimistic" or an "optimistic" view of economic conditions within and around Logan County but rather a collection and presentation of available information pertaining to the impact area associated with this project.

D. The only known locality for the spinulose wood fern on Mt. Magazine is in a highly mesophytic microhabitat on the north slope, where a colony of only a few plants occurs. There is no known locality for the species within the zone of the proposed hang glider areas on the south side, and based on the north slope habitat, suitable habitat for the species does not exist on the south side.

E. Features located on Figures 2.4 and 3.2 are not to scale and are not intended to indicate exact locations. The sphagnum seep community is not located close to Highway 309, and there is no justification for road construction and maintenance to be diverted to the north. There is no known historical association of small-headed pipewort with this particular seep, and the species has not been seen anywhere on the top of the mountain since the early 1980's.

Response to Comments in Letter No. 36 (Continue)

From: David E. Brown

DEIS No. 920367
October 27, 1992
Page 2-3

Comment No.	Response
-------------	----------

F. Section 4.5.2.2 of the DEIS indicated vegetation management around state park facilities and utility corridors would conform with the "Final EIS for Vegetation Management in the Ozark-Ouachita Mountains." This reference has been deleted. Vegetation management carried out by State Parks personnel would be limited to maintenance of administrative and recreation facilities. Analysis of the effects of a number of categories of maintenance and other actions which normally do not individually or cumulatively have significant effect on the quality of the human environment may be excluded from documentation in an EIS. Among the activities included in these categories are: mowing lawns, applying registered pesticides for rodent control, applying registered herbicides to control poison ivy on infested sites in a campground, and pruning vegetation along trails (Chapter 31.1b, Environmental Policy and Procedures Handbook). Further changes have been made to this section which indicate that vegetation management on park grounds will normally be done through mechanical means such as mowing and trimming.

G. The economic impact from the estimated increased short and long run employment changes, as well as the effects from the estimated increase in visitations are presented in the estimates of changes to retail sales figures and other economic variables presented in the DEIS including its appendices.

H. Arkansas State Parks intends to comply with Arkansas Pollution Control and Ecology regulations by installing above ground fuel storage tanks with a concrete containment basin. Cost for this facility is included in the line item for the 3-bay maintenance building with fence and yard. Arkansas State Parks currently utilizes steel tanks, surrounded by a concrete containment basin designed to contain 100% of fuel stored in the tanks. Accidental fuel release under these conditions is minimal. The possibility of accidental fuel release was included in analysis of effects of hydrocarbons in stormwater runoff. Data collected by the Environmental Protection Agency was used in this analysis, and represents the highest concentrations of hydrocarbons in runoff from Little Rock, Arkansas roads. This data would include accidental discharge of fuel oil from commercial sources. See Section 4.3.1.2 in the DEIS for more information.

C 3.0 The Affected Environment, 3.10.5 Labor Force, page 3-48, states, "The number of individuals choosing not to participate in the labor force seems relatively high when compared to the age make-up of the population (Section 3.10.2). In other words, the labor force participation rate within the five county area is lower than expected."

Comment: Dr. John Shelmutt, economist with the UALR, projects nonagricultural job growth in Arkansas for 1992 at 2.8%, which will surpass the national average (see Arkansas Democrat Gazette, October 23, 1992, page 1D). The economic corridor lying between central and northwest Arkansas has customarily benefitted from nonagricultural job growth. It should be noted, as shown in DEIS Figure 3.5, that the unemployment rate for Logan County, Arkansas ran higher than the state rate for 1980-1989 and dropped below the state rate during 1990 (see DEIS para 3.10.6). Labor force projections based on out-dated 1980 U.S. Department of Commerce data (see DEIS para 3.10.5 and Tables 3.13 & 3.14) presents an unnecessarily pessimistic economic view of conditions within and around Logan County, Arkansas.

D 3.0 The Affected Environment, 3.8.5. PETS Species Studied Further in this DEIS, page 3-30, omitted the Spinulose Wood Fern (*Dryopteris Spinulosa*) from further study. Only those PETS species that potentially would be effected by the proposed action were studied further in the DEIS.

3.0 The Affected Environment, 3.8.2 Plants, Spinulose Wood Fern, page 3-20, states, "A small population of this species can be found in the northwestern part of the mountain and outside the area of proposed park development."

Comment: The Spinulose Wood Fern was ranked as "threatened" by the state (see DEIS Table 3.3). This PETS species does lie outside the area of active construction, but is located within the proposed hang gliding area (see DEIS Figure 2.4). Since this PETS species is found in only one other locale within Arkansas, recommend that the Spinulose Wood Fern Mt. Magazine habitat be provided protection from intentional and/or accidental human incursion.

E 3.0 The Affected Environment, 3.8.2 Plants, Small-headed Pipewort (*Eriocaulon Korneckianum*), page 3-20. The PETS species identified as the Small-headed Pipewort was ranked "Endangered-extremely rare" by the state (see DEIS Table 3.3). The Small-headed Pipewort inhabits the sphagnum seep community (see DEIS para 3.6.6). This species is currently being studied for federal listing for protection under the Endangered Species Act.

Comment: DEIS Figures 2.4 and 3.2 places one of the few remaining sphagnum seep communities next to Highway 309, in the eastern part of the mountain. Recommend that road (Highway 309) construction and maintenance be diverted to the north. Recommend that a "larger than necessary" buffer zone (see DEIS para 4.7) be permanently established to prevent accidental and/or intentional human incursion into the Small-headed Pipewort's sphagnum seep community habitat.

DEIS No. 920367
October 27, 1992
Page 3-3

4.0 Environmental Consequences, 4.5.2.2 Effects of Operation and Maintenance Facilities, Structures and Grounds, page 4-38, requires that vegetation management conform to the guidelines considered to be environmentally acceptable for U.S. Forest Service lands.

Comment: The DEIS fails to specify which vegetation management techniques are to be exercised. The DEIS fails to provide data concerning PETS species (plant and vertebrate) sensitivity to herbicide applications, or the impact such applications would have on current surface and groundwater water quality standards if exercised.

4.0 Environmental Consequences, 4.7 Mitigation Measures, #5, page 4-56, states, "Larger than necessary buffer zones should be maintained around PETS plants and vertebrate species or species of special concern during construction and operation activities."

Comment: The DEIS does not define what is meant by the wording "should be maintained". The DEIS does not define what is meant by the wording "larger than necessary". Does this wording apply equally to both plants and vertebrate PETS species?

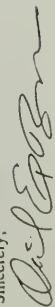
Comment: An approximate 1,000 ft wide vegetative buffer zone has been established under the DEIS (see DEIS para 4.5.2.1). Will this precedent (i.e. 1,000 ft buffer zone) be observed consistently throughout the draft and final EIS development process? What rationale and/or recognized protocol was observed in the calculation of a 1,000 ft buffer zone?

Appendix F: Engineering, Alternative D Annual Costs, Item 5., identifies a need for 3 - 1/2 ton trucks, 3 ranger cars, 1 van, 1 - 1 ton truck and 1 - 1 1/2 ton pick-up. Generic and specific construction costs, itemized under DEIS Appendix F, did not address on-site fuel tank storage costs.

Comment: The DEIS fails to explore the various construct costs for on-site above or belowground diesel and/or gasoline storage tanks, containment and ancillary devices as applicable. The DEIS fails to explore the environmental impact resulting from an accidental fuel release if such fuel storage options were exercised.

If you should have any questions regarding my comments, please feel free to contact me at (501) 534-5264.

Sincerely,



David E. Brown
801 Rosswood Colony Drive
Pine Bluff, AR 71603

cc: Ms. Judith M. Gallman, Arkansas Times, 201 E. Markham, Suite 200, Little Rock, AR 72201

Response to Comments in Letter No. 37

From: Steve Heye, Arkansas Chapter of the Sierra Club

Comment No.	Response
A.	Arkansas State Parks currently has no responsibilities for managing resources on Mt. Magazine. The permit which the Department of Parks and Tourism secured from the Forest Service simply authorized the preparation of an Environmental Impact Statement for the proposed State Park.
B.	Your preference for a missing alternative has been included in the content analysis as "A (mod)".
C.	Please refer to Section 2.3, Alternatives Eliminated From Further Study. Item number 8 addresses your comment.

THE ARKANSAS CHAPTER OF THE SIERRA CLUB RESPONSE TO THE MT. MAGAZINE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) OF AUGUST 28, 1992

INTRODUCTION:

Mt. Magazine and the DEIS each presents a vast rainbow of choices for the future of the Mountain. Opportunities are described in the DEIS for ways to spend well over 17 million dollars and create another Queen Wilhelmina type state park. (see Appendix E). Four of the five alternative plans offer various degrees of development including a one and a half million dollar water line, a waste water treatment system, a lodge, cabins, perhaps a bunkhouse, a gift shop, a restaurant, a museum, and more on the tallest mountain in Arkansas and on the last, large, undeveloped flat top mountain in the state. (White Rock, Petite Jean, Nebo, and Wilhelmina Mountains being already developed).

The DEIS is an excellent collection of facts, figures, history, dreams, and possibilities. However, the most startling features, in our opinion, are the documented failures of the U.S. Forest Service and the State Parks Department to adequately and properly protect all of the natural resources found on Mt. Magazine, AND the omission of what should have been a most obvious alternative plan.

THE PARADOX:

In the very first paragraph on page 1 of the DEIS one reads that the Forest Service and the Arkansas Parks Department, "... recognize the need to preserve, protect and enhance the ecological and cultural resources of Mt. Magazine, while promoting recreational use of the mountain."

On pages 2 and 7 the real and potential effects of the present management by the Forest Service and the Parks Department is described thusly because of "limited visitor control and regulation on the Mountain."

"Habitat degradation and trampling and loss of sensitive plant species ... These communities receive a consistent amount of visitation even though they are outside of designated recreational or day use areas.

The loss of sensitive plant species and unique or rich communities from natural successional processes and escaped campfires.

The potential for habitat destruction by camping and escaped campfires outside designated camping areas and lack of readily available fire protection.

Vandalism and unauthorized collection of archeological and historical resources as a result of limited visitor control and regulation.

The impairment of visual quality of the Mountain would continue as a result of vandalism and improper trash disposal.

Unrestricted access to steep bluffs would continue to be a safety hazard for visitors and rock climbers."

A For the past fifty eight years the Forest Service has had the responsibility of preserving and protecting all of the resources of Mt. Magazine and for the past

four years this has been a shared responsibility with the State Parks Department. On page 2-5, paragraph 2.4.1 it is stated that the current "level of management includes, but is not limited to, the following: maintenance of existing facilities, trails, structures, and grounds; continuation of waste collection services; recreational use and species inventories; limited species, habitat, and vegetation management and protection; and limited enforcement."

There are many, perhaps hundreds of, rules and regulations designed to preserve and protect all natural resources on federally owned and managed lands. At the public meeting in Little Rock on September 22, 1992 to discuss the DEIS, the Forest Service representative stated that there is "only one" ranger in the district who has enforcement responsibilities for Mt. Magazine, and that this person cannot meet other work tasks and adequately police Mt. Magazine.

B ALTERNATIVE A, NO ACTION-NO CHANGE-NO GOOD

The Arkansas Chapter of the Sierra Club finds Alternative A unacceptable because it does not address the existing failures of the Forest Service and the Parks Department to meet their legal and moral responsibilities to preserve and protect all of the resources on Mt. Magazine.

It is the position of the Sierra Club that before any objective consideration of any other alternative can be given: (1) this continuous neglect and acknowledged failure must be corrected, and, (2) the projected means of correcting this condition should be presented as an alternative NOT NOW included in the DEIS of August 28, 1992.

C THE MISSING ALTERNATIVE:

The Sierra Club raises the proposition that there is an alternative between Alternatives A and B which is a non-development alternative, a resource preservation and protection alternative, and an alternative which promotes low impact recreational use of Mt. Magazine.

This "Resource Protection Alternative" should evaluate the best ways to do exactly what the Forest Service and Parks Department state they want to do in ways that do not necessarily invite, lead towards, or promote the development characteristics found in Alternatives B through E.

Specifically, the "Resource Protection Alternative" should:

1. Examine various ways to place personnel on top of the Mountain either full time or during periods of greatest human use. (full time staff, seasonal staff, volunteer hosts, recreational interns from colleges, master's, doctoral, or sabatical students, or combinations of the above).
2. Provide physical control of the resource by permits, registrations, fees, gates, group limitations, etc. of general and special use areas for rock climbing, hang gliding, horseback riding, overnight camping, hiking, bird watching, star gazing, hunting, etc.
3. Demonstrate how a structure or structures for personnel can utilize the latest technological advances in the use of electricity, heating-air conditioning, the most advanced, water-free sewage composting system, garbage composting, and a water collection or transportation system, and others.

4. Project the maximum recreational use of Mt. Magazine in numbers and in activities which require no more development than outlined above, and which are compatible with efforts to maintain the Mountain resource in its present, relatively pristine, physical condition.

5. Project the potential economic impact such an alternative would have on the surrounding communities as has been projected for Alternatives B through E.

CONCLUSION:

The above areas are included to focus on issues and vital concerns not now raised in the present DEIS, and to suggest some of the components of a "Resource Protection Alternative".

THE SIERRA CLUB RECOMMENDS AND STRONGLY URGES THAT A RESOURCE PROTECTION ALTERNATIVE BE FULLY DEVELOPED AS AN ADDENDUM TO THE AUGUST 28 DEIS, AND THAT THIS ADDENDUM BE SUBMITTED TO THE PUBLIC FOR REVIEW AND COMMENT BEFORE A FINAL ENVIRONMENTAL IMPACT STATEMENT IS DRAFTED.

The above position paper and recommendations were approved by the Central Arkansas Group, Sierra Club on October 5, 1992 and by the Arkansas Chapter, Sierra Club on October 18, 1992.


STEVE HEESE, CHAIR
CENTRAL ARKANSAS GROUP
SIERRA CLUB

86 LAYNE CIRCLE
LITTLE ROCK, AR 72209
WORK PHONE 569-2541
HOME PHONE 455-2210

RECEIVED
OCT 30 1992

ARK STATE PARKS

"Na-Pepen"



Gary N. Ross, *FL*
6005 Stratford Avenue
Baton Rouge, Louisiana 70808
504 - 927-8779

October 28, 1992

RECEIVED
OCT 30 1992

ARK STATE PARKS

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, ARKANSAS 72201

Dear Mr. Butts:

Thank you for forwarding me the DEIS for Mt. Magazine. As a professional lepidopterist working with the Diana fritillary butterfly both in the southern Appalachian region and on Mt. Magazine, I am in a position to provide you with pertinent supplemental data (the comments in the DEIS regarding the Diana were provided by me by way of Mr. Rob Kopack of the USFS, Paris).

Although I have spent many weeks documenting the butterflies of Mt. Magazine, I regret that I still cannot be definitive with the Diana. In fact, the single most crucial bit of information--the host (larval) food plant--remains unknown. To date, not a single female Diana has been observed attempting to oviposit. Without that observation, I cannot define the breeding area for the species. In an effort to attempt to remedy this, I have proposed (and submitted) a research project for the summer of 1993. If the project is funded, then by the fall of next year I should be in a better position to offer more concrete suggestions. For now, however, I am providing you with the following comments.

Presently, I am inclined to hypothesize that the Mt. Magazine project as proposed by the Arkansas Department of Parks and Tourism will impact the Diana butterfly more than any of the region's other sensitive or endangered species. My preliminary work suggests that the Diana's habitat and range now coincide almost exactly with those areas being considered for development: the general region of the old lodge and cabin sites flanking Signal Hill. Male Dianas were observed searching for females ONLY in the Signal Hill region. Several females were, however, seen in three different localities: along hwy. 309 immediately south of the Greenfield Picnic Area, along hwy. 309 two miles north of the Grenfield P. A., and two miles east along the Spring Lake road. Both males and female butterflies are addicted to nectaring on four species of common roadside plants: orange butterfly weed (a milkweed), purple cone flower, *liatris*, and fall thistle. The host plant (in contrast to food plant), as stated earlier, remains an unknown. I am fairly confident, however, that it is one of more species of violet (all members of the genus to which the Diana belongs uses violets as their only host plant). Violets on Mt. Magazine seem to be most common along the roadsides and trails within the Signal Hill region. Since laboratory rearings of Dianas from the southern Appalachian region indicate that newly hatched caterpillars undergo an eight to nine month hibernation without feeding, concealed within ground litter, and, therefore, subject to

Response to Comments in Letter No. 38

From: Gary Ross

Comment No. Response

- A. Large concentrations of violets (*Viola* sp.) occur over wide areas of the mountain in early spring. Large populations of bird's-foot violet, *Viola pedata*, for example, are found on the south slopes as well as on top. Similarly, large populations of several other species of violet, both purple- and yellow-flowered, are associated with mesic communities on the north slopes. For these reasons we believe it has not been established that critical food plants for the Diana fritillary's larvae are restricted to the top of the mountain.
- B. Your suggestion to seed or plant Diana's food plants is noted. This activity will be considered in a separate Resource Management Plan for Mt. Magazine State Park.
- C. We agree with comments concerning timing of roadside mowing and collection policies. Please see Section 4.7, Mitigation Measure #12.
- D. Your preference for Alternative C has been included in the content analysis of all comments received.

ground fires, human and animal trampling, crushing from mowing machines and recreational vehicles, flooding, and pollution from runoff ground water, I suspect that the Diana's status on Mt. Magazine is quite precarious. It seems obvious that ANY alteration of the habitat atop Mt. Magazine will affect the species. But this need not be negative. In fact, I presently am inclined to think that the Diana species is a species dependent upon a certain degree of periodic land disturbance. And too, I suspect that the Diana, as with the American turkey and white-tailed deer, can be successfully managed, that is, its population can be controlled. As such, the species could actually BENEFIT from increased development of Mt. Magazine. But, caution is in order. The Diana once--and not in the too distant past--occupied a much larger range. In fact, the species has been extirpated from the majority of its historic range. Obviously, the species is not immune to all forms of environmental disturbances. I suspect that management would include:

1. Seeding (or planting) the Diana's food plants in newly disturbed areas such as around the visitor center, conference center, laboratory, etc. The host violet could, also, be introduced to these same regions.
2. Roadside mowing could be timed to cause minimal damage to the butterfly's food plant and larval stages.
3. Strictly enforced collecting policies.

But for now, all this is moot.

Until additional information is available on the Diana butterfly, I recommend the following:

1. Postpone any decision on the DEIS until after summer 1993 when additional information should be available.
2. If delayed action is unacceptable, I recommend adoption of ALTERNATIVE C as discussed in the DEIS. My reasons are as follows:

- a. Alternative A with its "no action" policy and without RNA status provides virtually no protection for Mt. Magazine. Overcollecting, vandalism, and over trafficking could eventually prove disastrous. Furthermore, since several of the sensitive/endangered species are dependent upon some level of disturbance (sub-climax habitats), "no action" would allow natural succession to progress and the mountain to eventually return to ecological climax status.
- b. Alternative B encourages unrestricted tourism without providing adequate resource protection. Mt. Magazine is too small, too fragile, and too special not to capitalize on the region's potential for full-blown ecotourism.
- c. Alternative D permits too much development for Mt. Magazine's fragile ecosystem, for example, pool, large lodge, historic homestead reconstruction. Traffic could be a serious problem for the Diana butterfly: polluted run-off from roadsides and human trafficking could severely damage the food and host plants for the species.

-3- Ross

- d. Alternative E is even more disruptive than Alternative D. I fear that this alternative would lead to the demise of much of Mt. Magazine's unique features. Arkansas has sufficient state parks for those tourists seeking non-environmentally oriented recreation.
- e. On the other hand, Alternative C with its concentration on research and educational programs provides maximum protection for Mt. Magazine's fragile ecosystem while at the same time permits a reasonable level of recreational activities and economic opportunities for local citizens in surrounding communities. In fact, Alternative C, by promoting ecotourism, has the potential for enabling Arkansas to forge itself onto the cutting edge of state park development for the dawning millennium. Our nation today is crying out for responsible stewardship of the environment. I will even be so bold as to suggest that the Arkansas Department of Parks and Tourism designate the Diana butterfly as the theme for the Mt. Magazine park. After all, the Diana is considered by most lepidopterists to be the most handsome of North American species, and butterflies are "in" with the public. Furthermore, since butterflies are symbols of ecological balance, a butterfly theme for the park would allow a unique opportunity for environmental education. I have no reservations that such a park would succeed. Furthermore, I would be delighted to assist the Arkansas Dept. of Parks and Tourism with such a development.

I hope the content of this lengthy letter is useful. In addition, I have enclosed several items (newspaper clippings on the Diana, my butterfly surveys of Mt. Magazine, and a copy of my research proposal for summer 1993). You are free to use these as you wish with the one stipulation that I am acknowledged for the contribution and appropriately cited.

Please contact me if I can be of further service.

Sincerely yours,

gary n. ross
Gary N. Ross,
Professor Emeritus

ENC. two newspaper article, three butterfly surveys, research proposal
XC. Mr. Rob Kopack
Mr. Ralph Odegard



ARKANSAS
HISTORIC
PRESERVATION
PROGRAM

RECEIVED
OCT 30 1992

ARK STATE PARKS

October 27, 1992

Mr. Lynn Neff
Forest Supervisor
Ozark-St. Francis National Forests
P.O. Box 1008
Russellville, AR 72801

RE: Logan County - General
Section 106 Review - USFS
Draft Environmental Impact Statement
for the Proposed Mount Magazine
State Park, Arkansas

Dear Mr. Neff:

My staff has reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Mount Magazine State Park. We have determined that Alternative A (the No Action, No Change Alternative) is the preferred course of action for the protection of historic properties. Since the project area is on federal land, cultural resources are covered under the Archeological Resources Protection Act. These resources could be protected by increased law enforcement coverage by the U.S. Forest Service.

A If the Forest Service chooses another DEIS alternative, historic properties in the project area must be identified and evaluated as per the regulations of the Advisory Council on Historic Preservation (36 CFR Part 800) as authorized under the National Historic Preservation Act. Those National Register eligible properties that would be adversely affected should be mitigated through data recovery. All data recovery efforts must meet the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716) and the standards for fieldwork and report writing in A State Plan for the Conservation of Archeological Resources in Arkansas.

Thank you for the opportunity to review this Draft Environmental Impact Statement. If you have any questions, please contact George McCluskey of my staff at (501) 324-9880.



Response to Comments in Letter No. 39

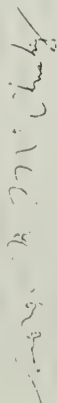
From: Cathy Beaufort, Arkansas Historic Preservation Program

Comment No. Response

- A. Paragraph 3.9 of the DEIS points out that a cultural resource field survey was conducted for all alternatives within this project and preliminary National Register evaluations were made. The survey report will be submitted to the SHPO at the end of the calendar year for their compliance review and comment. Paragraph 4.7 of the DEIS addresses the need for further work and the proposed mitigation through either data recovery or site avoidance.

39

Sincerely,



Cathy Buford
State Historic Preservation Officer

CB:GM:lh

cc: Governor Bill Clinton
Arkansas Department of Parks and Tourism
FTN Associates, Ltd.
SPEARS, Inc.
Advisory Council on Historic Preservation
State Archeologist

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

<p>Comments on Scientific Analysis:</p>	
<p>Why?</p>	<p>RECEIVED NOV 02 1992 ARK STATE PARK</p>
<p>Comments on Alternatives: I would highly recommend reconsidering the proposed alternative plan to Plan B. At this time Ark State Park is a very nice developed park. Providing an alternative to a developed park would be an advantage. My fear of the park has been by camping & hiking. Although many of my water is inconvenient. The more water there is, the more makes up for the inconvenience. Not having young water/cleanliness means less trailer/guests. Since these facilities are provided elsewhere in state parks I do not see a need for.</p>	
<p>Other Comments: Over the years I have preferred camping on National Forest Campgrounds. The primary reason is that a tent is more sheltered from roads, animals, & other people. I feel it is part of the state's responsibility to provide a diverse type of recreation use. Having all state parks at a level of use that is only appropriate to RVs does not provide for the whole state. Having Mt Magazine distinctly different from the rest of the state should be a consideration before development.</p>	
<p>Name <u>Charlotte Quattlebaum</u> (First) (Last)</p>	<p>Organization <u>Ark State Park</u></p>
<p>Street <u>3816 Glen Flora Way</u></p>	<p>City <u>Ark</u> State <u>Ark</u> Zip Code <u>72903</u></p>

Please fold and return this comment sheet to:

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Special report road goes

Response to Comments in Letter No. 40

From: Charlotte Quattlebaum

Comment No. _____ Response

A. Your preference for Alternative B has been included in the content analysis of all comments received.

TO THE ARKANSAS PARKS & TOURISM DEPT.
c/o RANDY ROBERTSON
LITTLE ROCK, ARK. 72201

Nov 1, 1992

PLANNING & DEVELOPMENT

1992

RECEIVED

MIC. ROBERTSON,

THIS LETTER IS IN REGARDS TO THE CONVERSATION YOU AND I HAD 29, OCT, 1992 CONCERNING THE DEVELOPMENT OF MNT MAGAZINE AS A STATE PARK.

DUE TO MY WORK OBLIGATION I WAS NOT ABLE TO ATTEND THE PUBLIC HEARING THAT WAS HELD IN LITTLE ROCK RECENTLY. I WAS ABLE TO ATTEND ONE MEETING, APPROXIMATELY 2 YEARS ~~AGO~~ AGO WHEN THE FIRST DRAFTS WERE PRESENTED FOR COMMENT.

I REALIZE THERE HAS BEEN A LOT OF NEGATIVE COMMENT FROM CONSERVATIONISTS WHO BELIEVE THAT DEVELOPMENT OF MNT MAGAZINE BY THE STATE PARKS WOULD DESTROY THE SCENIC BEAUTY OF THE IMMEDIATE AREA. HOWEVER - AFTER MY LAST VISIT TO THE MOUNTAIN I WAS SHOCKED BY THE SIGHT OF GARBAGE, TRASH, & LITTER ON BOTH SIDES OF THE ROAD AND AT THE BLUFF AREAS. - THOUGH THEY ARE A MINORITY (LITTER BUGS), THEIR CARELESS DISREGARD FOR NATURE AND MOTHER EARTH IN GENERAL WILL BE THE DOWNFALL OF THE ~~STATE~~ MOUNTAIN.

A THEREFORE I AM IN FAVOR OF DEVELOPING A PARK (ALTERNATIVE D) TO NOT ONLY ENHANCE THE BEAUTY OF MNT MAGAZINE BUT TO SAFEGUARD HER FOR GENERATIONS TO COME FROM THOSE WHO WISH TO DESTROY HER WITH THEIR UGLY TRASH.

Response to Comments in Letter No. 41

From: Richard Boyles

Comment No. Response

- A. Your preference for Alternative D has been included in the content analysis of all comments received.

MT MAGAZINE NEEDS SUPERVISION AND I FIRMLY
BELIEVE THAT BY PUTTING A STATE PARK ON
TOP OF HER THIS TRASHING AND SERIOUS VANDALISM
WOULD BE KEPT IN CHECK.

I HAVE A GREAT LOVE FOR MT MAGAZINE AND
I KNOW THAT THIS LOVE IS SHARED BY MANY. IT'S
LIKE AN OASIS IN THE MIDDLE OF A DESERT
LAND. I HOPE SHE WILL BE THAT OASIS FOR
MANY YEARS TO COME.

THANK YOU FOR ALLOWING ME TO SHARE MY
COMMENTS AND FEELINGS. GOD BLESS ALL OF YOU
IN YOU PLANNING AND GOD'S SPEED & WISDOM -

SINCERELY,

Richard Boyles
11/1/92

RICHARD BOYLES

10807 SAN JOAQUIN VALLEY

LITTLE ROCK, ARK. 72212

224-0302



RESPONSE FORM

ARK STATE PARKS

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS, however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: Arkansas is truly the Natural State. Mt. Magazine offers a wide range of environmental riches for professional observers and weekenders alike.

Why? The question is should we allow only a limited amount of human contact to the (Pete) area. The answer is to take the whole mountain as a park area but only allow a minimum area open to the public with strict supervisory control and guided tours of the other areas.

Comments on Alternatives: I thought they all were well thought out. I like certain parts of each. Alternative (D) is fine except do we really need a lodge at this park? We have 3 to 4 other parks in the general area, some bigger and some smaller. It seems that we could use more campsites & cabins and a reduced number of amphitheaters.

Why? This park is too spread out. It would be better if it were more compact such as Mt. Nebo.

Other Comments: Thank you very much for the opportunity to participate in the Deis. I look forward to camping here someday. I just hope that we're not trying to be too commercialistic with this piece of God's Great Wonder. But it does seem that in today's society that the only way to preserve this endangered beauty is to put it within a controlled environment. This is really a shame but because of the fall of morals within our society all things (plants, animals & nature lovers) must suffer.

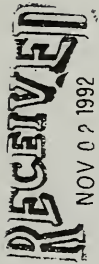
Name Dale Jones (First) (Mi) (Last) Dale Jones Organization Dimension Mill Supt.
 Street 411 Oak St. City Palestine State Ar. Zip Code 72574

Response to Comments in Letter No. 42

From: Dale Jones

Comment No. Response

- A. Your preference for a modified version of Alternative D has been included in the content analysis of all comments received.
- B. Your preference for changes to Alternative D has been included in the content analysis of all comments received. Please note, Alternative D proposes only one amphitheater. The amphitheater symbol shown at the proposed lodge sites in Figure 2.4 was in error. This has been corrected.
- C. The location and arrangement of facilities on Mt. Magazine is dictated, to a large degree, by topography, existing access and sensitive natural resources. These factors, in combination with the number of proposed facilities, result in a less compact state park design.



Susan Murray
1700 Hughes #25
Little Rock, Ar. 72207

ARK STATE PARKS

October 30th, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, Arkansas 72201

Re: Proposed Magazine Mountain State Park

Dear Mr. Butts:

In reviewing the DEIS for the proposed Magazine Mountain State Park, it came to my attention that the new endemic insect species a jumping bristletail, *Pedetontus gersheri* Allen (1992) (in press) had not been included. The source of this information is an article entitled, "The Biota of Magazine Mountain: An Outline of the Natural History of Magazine Mountain" (1992) by Robert T. Allen.

Thank you for the opportunity to comment on this very important project.

Sincerely,

Susan Murray
Conservation Biologist

Response to Comments in Letter No. 43

From: Susan Murray

Comment No. _____ Response

- A. Dr. Tommy Allen, authority on insects and other arthropods of Mt. Magazine, has indicated that the referenced species, *Pedetontus gersheri*, has not been published. Because the manuscript has not been selected for publication by a biological journal, it would appear doubtful that the name will be published prior to publication of the FEIS.

RECEIVED
NOV 02 1992

October 28, 1992

ARK STATE PARKS

Dear Sir:

Dogwood Trails Audubon Society, based in Fort Smith, Arkansas, favors alternative A among the proposals for the future of Mt. Magazine.

Please include our views in your process to determine public opinion.

Respectfully,

John J. Casey
Conservation Chairman
Dogwood Trails Audubon Society
522 N 47th
Ft. Smith, Arkansas 72903

Response to Comments in Letter No. 44

From: John Casey, Dogwood Trails Audubon Society

Comment No. _____ Response _____

A. Your preference for Alternative A has been included in the content analysis of all comments received.

202 S Barton - N
Little Rock AR 72205-6114
October 30, 1992

Greg Butts, Director
Arkansas State Parks
Arkansas Department of Parks & Tourism
#1 Capitol Mall
Little Rock AR 72201

RE: Mt Magazine DEIS Comments

Mr Butts:

In February of 1989, I wrote to Lynn Neff, Ozark National Forest Supervisor, to express my concerns about state plans for a park on Mt Magazine. In July, 1990, as instructed by your offices, I sent my remarks to FTN Associates. After reviewing the DEIS, I still have the same concerns.

The economic analysis that indicates only small profits for the state and a relatively few jobs for local residents does not adequately investigate the parks impact on nearby lodging and restaurant businesses. Tourists staying at the new park would no longer bring their business to motels in towns such as Ozark, resulting in a loss of jobs.

I do not believe that the purpose of a state park is to produce a profit. Therefore, analyzing various options based on potential income is no way to decide what is the best course for Mt Magazine.

One option has been largely overlooked (perhaps it should be A1). Leave the mountain top alone and simply increase ranger patrols to reduce the alleged vandalism problems. The special use permit could be returned to the Forest Service, or the patrols could be operated as a joint venture of the NFS and the state. The mountain top should remain a natural area, much like the Cassatot, with the minimal developments that already exist

I favor some version of option A. The state cannot afford another mountain resort and the mountain cannot afford to be destroyed for profit by short sighted state plans.

Sincerely,

Mark Barnhard

cc: Dale Bumpers, US Senator
Ken Smith, Governor's Office
Lynn Neff, Supervisor, Ozark National Forest

Response to Comments in Letter No. 45

From: Mark Barnhard

Comment No. Response

A. The economic analysis included an estimated "profit" statement primarily out of a requirement to be comprehensive in the approach employed, not necessarily to form a basis for decision making.

The impact on the local economy was estimated within the changes on the local sales projections based on the various alternatives. It is likely that the increased visitation to the park will be greater than the lodge can facilitate most of the time, thereby contributing to an increase (not a loss) of "business to the motels in the towns such as Ozark."

B. Please refer to Section 2.3, Alternatives Eliminated From Further Study. Item 8 addresses your comment.

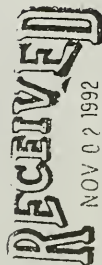
C. Your preference for Alternative A has been included in the content analysis of all comments received.

ARKANSAS AUDUBON SOCIETY

C/O Thurman Jordan, President
4000 South "S" Street
Ft. Smith, AR 72903

November 2, 1992

Mr Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

Dear Mr Butts,

The Arkansas Audubon Society wishes to take this opportunity to submit public comments on the proposed park facilities on Mount Magazine. These comments on the Draft Environmental Impact Statement are being jointly presented by President Thurman Jordan and Vice-president Barry Haas on behalf of the Society.

The Society has been represented in some manner or form at all listening sessions conducted at Little Rock and Paris. However, we and other members of the Society were speaking and submitting written comments as individuals and concerned citizens. Our collective as well as individual position statements are on public record. Our position since 1989 on development of Mount Magazine has been one of the priority items on the agenda of the Arkansas Conservation Coalition to which the Arkansas Audubon Society belongs

Under Alternatives B, C, D and E aesthetic qualities of beauty, tranquility and solitude would be sacrificed for a common playground containing commercial lodging facilities. Preservation of the aesthetic qualities of natural beauty apparently was of slight concern to authors of the Draft Environmental Impact Statement for Proposed Park, even though the National Environmental Policy Act of 1969, as amended, mandates consideration of aesthetics as a multiple-use resource

In our deliberations we have relied heavily upon the intensive survey of the arthropod fauna of Mount Magazine by Robert T. Allen, Ph.D., who asked the Arkansas Natural Heritage Commission to evaluate Mount Magazine for consideration as a National Natural Landmark. We have relied equally upon the comprehensive field source report by geologist Dr. Vic Vere and his appeal for "no development" of Mount Magazine

Although Dr. Allen has left the state for employment elsewhere, we understand that he is an active on-site consultant to the U.S. Forest Service and his services are available to the Mount Magazine Environmental Impact Statement Committee

Response to Comments in Letter No. 46

From: Thurman Jordan/Barry Haas, AR Audubon Society

Comment No. Response

- A. The final design will incorporate environment-sensitive features that will provide the same aesthetically pleasing components found at other state park developments.
- B. Your preference for Alternative A has been included in the content analysis of all comments received
- C. Appendix E, Parts II and III provide the demand estimations. These estimates represent net new visitors based upon travel time and distance and relative attractiveness of the facility. The recreational demand model considers income and population of urban centers such as Dallas-Ft. Worth, Kansas City, St. Louis, Oklahoma City, etc. as well as the population of surrounding areas. The estimates are of new visitors.

Page 2
Letter to Greg Butts
November 2, 1992

B Dr. Allen and Dr. Vere may consider it inevitable that degradation of the fragile environment around the old lodge site and around the cliff line will take place because Arkansas history shows that politics usually prevails over good environmental science. But the Arkansas Audubon Society is optimistic in the belief that we are entering into a new era of environmental reform and that good science and aesthetics will prevail in the choosing of Alternative A, which is "no new development".

Please understand that our concerns are not all on environmental grounds. The membership of the Arkansas Audubon Society has reservations about the proposed park that go far beyond the obvious potential for significant and irreversible environmental damage on Mount Magazine. As citizens and taxpayers here in Arkansas, we are equally concerned over the considerable economic drawbacks to the DEIS alternatives calling for change. Arkansas State Parks has produced a video (your 'Legacy' program) describing the current difficulty of properly maintaining existing parks facilities. Our first obligation is to keep up existing parks facilities before any consideration be given to adding a new facility. No consideration should be given to expansion, on Mount Magazine or anywhere else, until the citizens of Arkansas can be assured that the current park system infrastructure is being properly maintained. To propose otherwise borders on malfeasance.

Arguments have also been made that the proposed park would generate a 'profit'. This, of course, assumes that the many millions of dollars required initially to build the proposed facilities be forthcoming from the state treasury without having to be returned to public coffers at some future date. The sense of this being a profitable venture is, of course, absurd. If such profit making potential existed for lodging facilities in the Mount Magazine area, an entrepreneur from the private sector would have long since taken advantage of it. Maybe, just maybe, an operating profit can be maintained at times, but at what cost? Disregarding harmful environmental effects, hasn't anyone heard about our state budget difficulties?

Mount Magazine is one of the few lightly developed mountaintops left in Arkansas. Do Arkansas state agencies accept any measure of responsibility to protect our few remaining undeveloped mountaintops and free-flowing streams for the future? Or will they go the way of the dinosaur?

C Another economic concern is a determination of the saturation point as regards these lodge type facilities. What if the potential revenue for the Mount Magazine lodge is drawn from Petit Jean, Wilhelmina and other already existing state-supported competitors? There is the potential for these lodges to cannibalize each other in their search for more revenue. How do we know if 'new' tourist business will truly be created?

Page 3
 Letter to Greg Butts
 November 2, 1992

In conclusion, we have a responsibility as stewards of Arkansas to preserve and protect natural havens, be they undeveloped mountaintops or undammed streams, around the state. Our children, and their children, deserve no less diverse natural world than we are now able to enjoy. Our natural diversity is a strength, not a weakness, and one worth working to preserve and protect.

Sincerely,

Thurman Jordan
by Barry H. Haas
 Thurman Jordan
 4000 South 'S' St.
 Ft. Smith, AR 72903
 783-4903

Barry H. Haas
 Barry H. Haas
 3900 Doral Dr.
 Little Rock, AR 72212-2826
 225-5096

November 1, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, Arkansas 72201

Andrew L. Miller
P. O. Box C-50
Little Rock, Arkansas 72203-0050

Dear Mr. Butts:

I am writing in response to the Mt. Magazine DEIS. I support the development of a park on Mt. Magazine for the protection of our state's natural resources. I work for a consulting firm as a geologist and hydrologist. I have completed several EIS report and feasibility studies. I would like to commend FTN, the State Parks and the USDA Forest Service for their efforts on the Mt. Magazine project.

Below are my comments, questions and opinions that I would like entered into record. I request that responses to these items be send to me at the above address.

As I stated above I feel that Mt Magazine needs protection but I do not see how the development of Alternative D is necessary. There are three problems with this alternative as it regards protection of the environmental resources on the mountain.

One- If the lodge is placed on the original site near the bluffs it would block one of the best views on the mountain. This is visual pollution and can be easily eliminated.

Two- If the lodge is placed on the original site, and the predicted 200,000 or so visitors come each year, the traffic around this lodge would certainly damage the sensitive area around the bluffs.

Three-The DEIS states in several places that "Rock climbing is not expected to increase; therefore unique species that inhabit the crevices of rock outcrops and bluffs on the south side of the Mountain should not be affected by recreational use." This statement is far from reality.

I have been to many climbing areas around the world and have seen first hand what increased access by development has done to several climbing areas. First I would point to Pinnacle Mt. State Park. In 1972 there were a few rough trails, no parking lots and little control. Yes there was trash, but there was not much use. Today, there are many trails,

Response to Comments in Letter No. 47

From: Andrew Miller

Comment No.	Response
A.	The original lodge had a large patio area behind the building where the public could look off the mountain. Design of the proposed lodge on this site would maintain the opportunity to enjoy the view toward the south.
B.	There are few sensitive biological features of significance on the bluffline in close proximity to the historic lodge site. Those few elements of concern would include small patches of broom nailwort and the rufous-crowned sparrow; both of which will be protected by active habitat management and visitor traffic control through the use of designated trails.
C.	Your comments have been noted, and we agree that rock climbing does have the potential to increase. Again, however, we would note that very few species of concern occur on the south face of the Mountain currently used by climbers. For that reason, rock climbing is not expected to have adverse impacts on sensitive species on the south side of the Mountain.
D.	As indicated above, we agree that rock climbing does have the potential to increase on the Mountain.
E.	Training costs for Arkansas State Parks staff is included in all standard Operation and Maintenance Budgets.
F.	Where climbing is allowed, some park staff is trained in vertical rescue. Please note that references to cabins without kitchens have been deleted from the FEIS.
G.	Both the transfer of park personnel into the area and the creation of jobs for the local area will benefit the local community as described in Appendix E, Part II. The concept of an economic multiplier indicates that any new employment and new income have secondary effects of generating additional employment and income.
H.	Cost estimates for cabins and employee residences include contract cost, including utilities, access and appliances. The cost estimates for cabins include all furnishings.

RECEIVED
NOV 02 1992

ARK STATE PARKS

Response to Comments in Letter No. 47 (Continued)

From: Andrew Miller

Comment No.	Response
I.	Water line costs are estimated as follows: 6 inch - \$7.50 per foot, 3 inch - \$6.00 per foot, and 2 inch - \$5.00 per foot. Estimated 3 inch sewage force main costs are \$6.00 per foot. The sewer lines will be part of a low pressure collection system. Estimated power line costs were provided by personnel from the Arkansas Valley Electric Cooperative. All of these estimated utility costs are reasonable based on the expected laying conditions.
J.	The 3 inch water lines are not intended to be used for primary fire protection purposes. A 6 inch water line will serve those facilities requiring fire protection including the lodge, cabins, visitor information center, employee residences, and the maintenance building. An 85,000 gallon water storage tank is proposed to be constructed on Mt. Magazine. The estimated average daily water consumption for the preferred alternative is about 21,000 gallons per day. The storage tank, therefore, will provide about four days of storage, which should be sufficient for both domestic and fire protection purposes.
K.	Strong local and regional support for re-establishing lodging on Mt. Magazine resulted in the involvement of Arkansas Department of Parks and Tourism and the proposal to develop a state park on Mt. Magazine. See Section 1, Purpose and Need for more detailed background on this proposal. No negative effect is expected in regard to visitation to Petit Jean, Mt. Nebo, Queen Wilhelmina, and Devil's Den. During peak use periods, hundreds of visitors are turned away from these parks because all lodging has been booked. Analysis of demand for proposed facilities on Mt. Magazine is presented in Appendix E, Part 2 of this document.

parking lots and rest rooms. The traffic up this mountain has increased at least three fold. The trails are in bad conditions and regulations have curtailed climbing activities. Second consider Eldorado Canyon, and Yosemite Valley. These are two of the best climbing areas in the country. In the 1960's there was little development and traffic through these areas. Today Yosemite is one of the largest parks in the US with a very high visitation. These examples should demonstrate that development in a climbing area will increase traffic and climbing activities. The statement that climbing is not expected to increase is not valid and therefore the issue of environmental impact must have further attention.

It should also be pointed out that development in a climbing area would require that the park personnel be trained for vertical rescue. This is not a easy and inexpensive task. I have trained several groups in vertical rescue and I know how much time and money it takes to provide a basic response group. This item was not included in the operation cost and should be considered.

Next I would like to state that cabins without kitchens are a bad idea. Cabins without kitchens will require the construction of the lodge and restaurant. Where would the guest eat if the lodge was not built? I know the lodge is something that the Parks want but consider building the cabins first and see if the visitation warrants the construction of a multi-million dollar building. Also the community will not benefit from these cabins because the users will not need to buy any supplies and food.

The DEIS states that this project will benefit the surrounding area with income and jobs. I question this because most of the high paying jobs will come from Park personnel that are transferred. This would be a really good Park to work at and the competition would be stiff. I know that several positions like maids, cook and general labors will be staffed from the community, but this is only 20 people and most are not high paying jobs. How will the community really benefit?

I have looked at the cost of construction and have several questions?

15 housekeeping cabins for \$1,506,667. This is would be over \$100,000 each. This is a very inflated price for house construction. This also holds for the employee residences. These must be extremely nice!

The units cost of the water lines range from 3 to 6 dollars a LF. This is very low, maybe two or three time too low. There needs to be excavation and bedding added to the cost. The same applies to the sewer lines and the power lines.

A 3 inch water line will not carry adequate flow for fire fighting. In all cases we put fire hydrants on 6" lines. If you use a pumper truck to suck water from a 3" line it may collapse the lines or damage the fittings. Take a good look at what your fire protection needs are and

Comments
Page 3


how they are to be addressed.

With these points above, I feel that the cost estimate & projected visitation should be examined very closely. Are there any other mistakes?

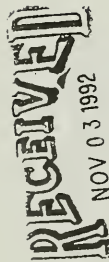
K The last point I have is WHY does the state need another park? There are four mountain type parks within 100 miles or so of Mt. Magazine. How will another full service park effect visitation at Pettit Jean, Devils Den and Mt. Nebo?

Thank you for the opportunity to comment on the Mt. Magazine issue. I hope my comments will be of some help and I look forward to hearing from you

Sincerely,



Andrew L. Miller



ARK STATE PARKS

October 30, 1992

Mr. Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Re: Proposed Mount Magazine State Park

Dear Mr. Butts:

After attending the meeting in Paris on September 29th and studying the DEIS, I have decided that I am opposed to the proposed development of a State Park on Mount Magazine for the following reasons.

First, it is obvious that the State of Arkansas does not have the millions of dollars necessary to implement the proposed development. We cannot even adequately fund Medicaid, etc., which I believe most people would consider more essential than developing a new State Park. The State Parks we have now do not even have adequate funding, and there are already several in the same general vicinity of Mount Magazine, such as Mount Nebo, Petit Jean, Devil's Den, Lake Fort Smith, Queen Wilhelmina, etc.

Second, I believe that the management of Mount Magazine by the U.S. Forest Service has been very good, and continued management by the Forest Service (Alternative A) offers many benefits to the citizens of Arkansas. Currently, Mount Magazine is open to the public and is easily reached by paved roads. From what I have read, at least 50,000 people a year visit the mountain for sight-seeing, camping, picnicking, hiking, rock climbing, hang gliding, and other activities. Surprisingly, there is a very small amount of litter. Camping is free, which is a great benefit to those on limited budgets. The mountain is extremely peaceful, and it is possible to sit for long periods of time (although near paved roads) without hearing any noises except bird calls and other natural sounds. This is a very rare experience--in fact, I don't know of any other public area in Arkansas in which this is possible without hiking far away from roads.

Response to Comments in Letter No. 48

From: Carolyn Boulden

Comment No. _____ Response

- A. Your preference for Alternative A has been included in the content analysis of all comments received.

Page 2

Under the current management by the Forest Service, the citizens of Arkansas are receiving these great benefits from Mount Magazine without having to spend large amounts of money. The development of a lodge, cabins, RV sites, etc. will only cost vast sums which we do not have, cause a tremendous increase in the amount of litter, unnecessarily duplicate plentiful nearby facilities, disturb the recovering wildlife, and destroy the rare peace and tranquility now existing on this unique mountain.

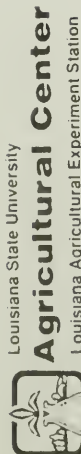
Why should we mess up a good thing?

Sincerely,

Carolyn Boulden

Carolyn Boulden
19 Ferndale
Fort Smith, AR 72901

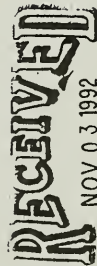
cc: Honorable Bill Clinton
Honorable Dale Bumpers
Honorable David Pryor
Honorable Bill Alexander
Honorable Ray Thornton
Honorable John Paul Hammerschmidt
Honorable Beryl Anthony, Jr.
Honorable Travis Miles
Honorable Bill Walters
Honorable Frank Williams
Honorable B. G. Hendrix
Honorable Carolyn Pollan
Honorable Ralph Blair



Department of Entomology
402 Life Sciences Building
Baton Rouge, LA 70803-1710
(504) 388-1634
Fax (504) 388-1643

October 29, 1992

Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201



ARK STATE PARKS

Dear Mr. Butts.

I have reviewed the Draft Environmental Impact Statement for the proposed Mount Magazine State Park. I agree with the proposal that some form of regulation will eventually be needed to prevent vandalism, litter accumulation and abuse of the park's natural resources. As a professional entomologist, naturalist and one who enjoys the outdoors, I would like to see any construction and development occur with as little impact on the natural environment as possible. The development alternatives discussed in the Draft EIS take into account the unique flora and fauna found on the mountain. Alternatives B, C and D offer the best balance of retaining natural diversity, protecting and conserving PETS species, regulation of use and increased development. I can support any of these 3 alternatives.

Implementation of the alternatives and the locations of the proposed buildings and facilities should have minimum impact on the PETS species found on the mountain, since proposed construction would occur in areas previously disturbed (original lodge and quarry sites). The development alternatives appear to be designed to encourage nature-oriented recreation and not the amusement-park recreational atmosphere like that found at Queen Wilhelmina State Park. This line of development is in keeping with the mountains biological and geological uniqueness and reflects careful planning and consideration by USDA Forest Service and the Arkansas Department of Parks and Tourism.

As an entomologist, I am most concerned about the effects of development on the long term survival of the Diana Fritillary, *Speyeria diana*, on Mt. Magazine. I have visited the mountain during late June and or early July from 1988-1991 to observe the Diana Fritillary. I agree with observations and concerns expressed in the DEIS about S. diana and would like to offer some additional information

Response to Comments in Letter No. 49

From: Thomas Riley

Comment No.	Response
A.	Your support of Alternatives B, C, or D has been included in the content analysis of all comments received.
B.	A separate Resource Management Plan will address the issue of collecting of biological materials on the mountain.
C.	Your offer to assist in future studies of this species is noted and appreciated.

Greg Butts
October 29, 1992
Page 2

During the last 10 days of June 1988 numbers of S. diana and S. cybele, the Great Spangled Fritillary, were high. Both species were common, several of each could be found on flowers of any of the Asclepias tuberosa, (butterfly weed) growing along Hwys 309 and 1606. Both S. diana and S. cybele were found everywhere on the mountain above 2300'; from the eastern to western limits of this elevation. They were most abundant around the Greenfield Rec. Area and intersection of 309 and 1606, north along 309 to the abandoned quarry and along 1606 to the Cameron Bluff Campground. I only found S. diana above 2300' altitude. Although butterfly weed was in bloom at lower altitudes I did not observe any S. diana, only S. cybele.

I have never seen S. diana at Queen Wilhelmina State Park where elevation exceeds 2300', nor do I know of any existing populations in the Mts. of Eastern Oklahoma. The observational and anecdotal evidence suggests that the Mt. Magazine population of S. diana could be the western-most population of this species in the U.S., genetically and geographically isolated from those in the Appalachians. The fact that in 1988, S. diana were so abundant on the mountain top and apparently absent below 2300' leads me to suspect that they are restricted to the top of Mt. Magazine. Because of this S. diana and its habitat should be protected on Magazine Mt.

Based on their abundance in 1988, I attempted to conduct a mark and recapture study of S. diana in 1989, 90 and 91 on Mt. Magazine. As reported in the Draft EIS, numbers were very low during those years. I only sighted 3 ♂ in 1989, 1 ♂ and 1 ♀ in 1990 and 1 ♂ and 1 ♀ in 1991. Therefore no data on the movement of individuals was collected. The drought conditions of 1988 may have played a role in the abundance of S. diana in 1988. Speyeria cybele was also very scarce in 1989-90 and 91.

The development alternatives proposed in the Draft Environmental Impact Statement do not appear to drastically effect enough area to have a significant negative influence on S. diana. However, it is not know what specific habitat, host plants and environmental conditions are needed for oviposition and larval development of S. diana on Mt. Magazine.

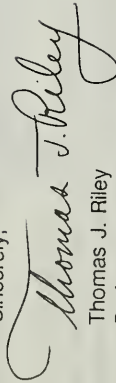
Although development alone will have some effect on S. diana, the additional threat of increased non-scientific collecting due to increased visitor traffic to the park, combined with weather and other stresses could eventually cause the extinction of the S. diana population on Mt. Magazine.

I strongly suggest that collecting of S. diana and other PETS species in the proposed park be restricted to scientific purposes only. The DEIS proposes regulation of collecting, further study and monitoring of S. diana and other PETS species on Magazine Mountain. I strongly support the implementation of this policy.

Greg Butts
October 29, 1992
Page 3

C I also take this opportunity to offer my assistance in studies of *S. diana* on Magazine Mt. I'd be pleased to work with the appropriate State and Federal Agencies to conduct research on *S. diana* to be used to ensure its continued survival on Magazine Mt.

Sincerely,



Thomas J. Riley
Professor of Entomology
Louisiana State University
Baton Rouge, LA 70803
(504) 388-1634

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

The scientific analysis appears to be as complete as available data allows. Limited data on biology & ecology of some PETS species prevents a more detailed evaluation of the effects of development on these species.

Why?

Comments on Alternatives:

The 5 alternatives represent realistic options for levels of development & recreational use of Magazine Mt. The proposed construction sites should have a minimum negative impact on PETS species and on the mountain's environment since most proposed construction is planned to occur on sites of previous construction, Why? or for areas disturbed by previous construction activities.

Other Comments:

Please see accompanying letter.

Why?

Name	<u>Thomas J. Riley</u>	Organization	<u>Entomology Dept.</u>
	(First) (Mi) (Last)		
Street	<u>Louisiana State University</u>	City	<u>Baton Rouge State LA</u> Zip Code <u>70803</u>

Please fold and return this comment sheet to: Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Judith M. Gallman
2300 Rebsamen Park Road, Apt. D-203
Little Rock, AR 72202

October 29, 1992

Greg Butts
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72202

Dear Mr. Butts:

I am writing in response to the proposed developments for Mount Magazine as specified in Alternative D, the so-called preferred alternative, of the August 1992 Draft Environmental Impact Statement. The degree of development the alternative suggests is alarming, directly contradicts the mountaintop's rustic charm and contains some serious flaws.

One area the DEIS does not adequately consider is how the mountain's natural watershed will be affected by the addition of 30 or more acres of new pavement. Such a dramatic change could almost certainly annihilate an endemic species such as the Magazine Mountain shagreen and severely alter the mountain's natural drainage practices. This critical issue warrants in-depth study by a qualified hydrogeologist.

The degree of development in Alternative D is heavy, and a reduction in scale should be considered. Specifically:

The proposed lodge should be built at the alternative site, not at the old lodge site. The alternative site disrupts fewer proposed, endangered, threatened or sensitive species.

Such a lodge should have a maximum of 40 rooms at the maximum and no more than five cabins.

Employee housing should be limited to a location near the visitor center or off the mountaintop.

An effort should be made to include free, primitive campsites when existing campsites are full developed.

Any fencing off of the cliffs should be setback markedly from the edge of the cliffs for safety reasons, and such fencing should be as aesthetically pleasing as possible--not a chain-link fence.

Evaluate sewage treatment facility locations.

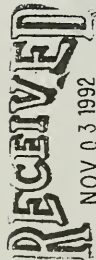
The alternative should abandon the 19th century homestead.

Please consider the serious irreversible impacts set forth in Alternative D. Thank you for your time in this important matter.

Sincerely,

Judith M. Gallman

Judith M. Gallman



ARK STATE PARKS

Response to Comments in Letter No. 50

From: Judith Gallman

Comment No. _____ Response _____

A. The extent of new pavement under Alternative D will be approximately 18.5 acres. The Magazine Mountain shagreen is a terrestrial species that would not be impacted by drainage features on the mountain.

The EIS team included a qualified hydrogeologist who contributed to the analysis of impacts of park development on runoff, drainage, and endemic species off the mountain top. It is not the case that these issues were not adequately considered or covered. The area to be developed under the preferred alternative represents only a small fraction (less than one 1%) of the total mountain-top area. Run-off from this area will be distributed among several discrete drainages or watersheds as it leaves the Mountain; no single watershed will receive a large amount of stormwater run-off. The projected increases in flow and sediment transport are projected to be small, do not represent a significant impact to any ecosystem component off the mountain top, and are generally within the ranges of the natural system. In particular, impacts to any endemic species are projected to be inconsequential. This especially includes the Magazine Mountain shagreen, which is a terrestrial species and should not be impacted by these changes.

B. Your preference for changes to Alternative D development has been included in the content analysis of all comments received. Please note, Section 4.7, Mitigation Measures #24 and #27 address the issue of aesthetically pleasing fencing near the cliffs.

RECEIVED
NOV 04 1992

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

<p>Comments on Scientific Analysis: My wife, Olga, was in Paris High School Biology Science about 25 years. She used Mt. May as an enjoyable outdoor activity for her students each year. The last we ever heard of individuals from more of this island ecosystem to learn in science and level of life that it holds for individuals of families to making their increased importance and awareness that we can pass on to future generations. It has always been of utmost importance to preserve the preservation of this place of beauty, to protect it, to prevent to fish and over some of many scientific activities and also spiritual satisfaction as well as recreational activities.</p> <p>Comments on Alternatives: It is certain that Mt. May will always be used both as a nature lab for study and a haven for the natural tourist. I would favor Alternative D as the one to maintain the balance of #1 preservation, #2 enjoyment - and recreation, #3 scientific environment, because of adequate security that the other you not had before. And it opens it up for individuals for more people to learn to enjoy it in a safe carefully way. We will feel a controlled sort of way that the agencies responsible do their jobs as they should.</p> <p>Other Comments: Our very good friends & former neighbors Gordon & Lois Brown (and their family) have been very instrumental in helping us become so well "acquainted" with the Mt. May area over the years. They are well understanding people who have given many facts & information, is shared by sharing some of their knowledge & love of Mt. May.</p> <p>Why? Sincerely, Fred & Olga Hander, 1991</p>	
<p>Name <u>Fred & Olga Hander</u> (First) (Last) Street <u>Rt 21 Box 1910</u> City <u>Paris</u> State <u>Ark</u> Zip Code <u>72855</u></p>	<p>Organization <u>Arkansas State Parks</u> (First) (Last) City <u>Paris</u> State <u>Ark</u> Zip Code <u>72855</u></p>

Please fold and return this comment sheet to
Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Response to Comments in Letter No. 51
From: Fred Hander
Comment No. _____ Response
A. Your preference for a modification of Alternative D development has been included in the content analysis of all comments received.

November 1, 1992

Arkansas State Parks
#1 Capital Mall
Little Rock, AR 72201

Dear Sirs,

I am writing this letter in regard to the Draft Environmental Impact Statement for the proposed park on Mount Magazine. I have just finished a study of the document and am concerned about the gross errors and lack of in-depth research that is so apparent in the document.

I am a member of the Society for the Study of Amphibians and Reptiles, the American Federation of Herpetoculturists, the Arkansas Herpetological Society, and the Oklahoma Herpetological Society. When I reviewed the section that refers to the herpetofauna of the mountain I was appalled at the mistakes that jumped out at me. What's really amazing is that the mistakes aren't of a highly technical nature. A fifth grade student with a field guide bought at a local book store could have detected the gross errors. What this tells me is that the information was thrown together by someone without a clue as to what they were compiling.

If there are so many errors in this small section of the study, what assures me that the rest of the document has not been assembled with the same disregard for careful study and evaluation? Evidently FTN didn't even check out their own data for accuracy. If they had, they would have certainly discovered that one of the snakes they listed in Table C.3. is not, and never has been, found within the state of Arkansas. They have listed themselves as the information source for that entry. If they truly had found a Southern Hognose Snake, *Heterodon simis*, they should have threw up a flag right there! It would have been one of the rarest finds in the state. Evidently they didn't even check out their own (mis)information. There are eleven mistakes in Table C.3. alone! (The listing of Constrictor constrictor constrictor in the Taxa column was a source of great amusement to many people who viewed the document. That's the old Latin name for a South American boa! Campers beware!) Are we supposed to accept this document as being factual and reliable with information as accurate as that? The AHS was listed as an information source on the table. That was done without any input from the AHS. If they had given the information it would not have been such a collection of ignorance. Speaking as a member of the AHS, I am embarrassed to have our name associated with such a document.

An undertaking with this great of a potential impact on the mountain deserves the best evaluation that it can be given. It is clear to me that this has not been accomplished.

Sincerely,

Bill Talbert
Bill Talbert

RECEIVED
NOV 04 1992
ARK STATE PARKS

Response to Comments in Letter No. 52

From: Bill Talbert

Comment No. _____

Response

A. The error regarding the hognose snake has been corrected, and several other errors in Table 3.C have been corrected. We thank you for your attention to detail.

The information from the Arkansas Herpetological Society (AHS) has been cited as from the Society's December 1989 newsletter article.

RECEIVED
NOV 04 1992

RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis:

Why?

Comments on Alternatives: ALTERNATIVE D IS THE CHOICE ALTERNATIVE

Why? IT WILL ATTRACT TOURISM AND PRESERVE THE REMAINDER OF THE MOUNTAIN FOR THE ENVIRONMENTALISTS, ARCHEOLOGISTS, ETC.

Other Comments: DEVELOPMENT OF MT. MAGAZINE WILL BENEFIT PARIS, DANVILLE AND OTHER AREA TOWNS FROM TOURIST TRADE BROUGHT TO THE STATE AND NEW JOBS CREATED BY THE DEVELOPMENT.

Why? ECONOMIC IMPACT DURING CONSTRUCTION AND AFTER DEVELOPMENT. ADVERSE CONDITIONS WILL BE OVERCOME BY ALL THE ADVANTAGES OF DEVELOPMENT.

Name TENNIE DALE KEETON Organization THE FIRST NATIONAL BANK AT PARIS
(First) (Mi) (Last)
Street 11 WEST MAIN, P.O. BOX 31 City PARIS State AR Zip Code 72855

Please fold and return this comment sheet to: Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

Response to Comments in Letter No. 53

From: Tennie Dale Keeton

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.

October 31, 1992

Gregg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, Ar 72201



Dear Sir:

ARK STATE PARKS

I have lived in the Paris, Arkansas area for my entire life and have spent many pleasurable hours on Mt. Magazine. This mountain is the centerpiece of this area and is probably the reason many people settled in this area years ago.

I have seen this mountain used and abused through the years. After living in Fort Smith for several years, I moved my family back to this area in 1971 and soon after the lodge on top of the mountain burned under suspicious circumstances. Also the Paris Grade School burned and my oldest child went to school in the Baptist Church for some three years. These were trying times for residents of this community, but they pulled together and have survived.

I am a hunter and fisherman and will continue to support the rights of these people and most of their concerns. I am also a businessman in this community who saw the population of this city at about 5000 in the 50's and about 4000 now. If small communities such as this are going to survive, they need some type of industry and tourism is probably the cleanest and environmentally safest ways to provide this. I would speculate that the hunting camps in this forest area are more harmful to the environment than the approximately fifteen acres that will be developed on top of the mountain in "Alternata D".

A

I have spent some 10 years working actively with the Cub and Boy Scouts in Paris. I still work in a less active role with the scouting program. I am very proud to have been involved with this fine organization and to have seen many fine young men work their way through the ranks and become fine productive citizens who respect and care for their environment.

It appears that most of the people who oppose this development have either never actually set foot in this area or have no idea what this would mean to this community as well as to the state of Arkansas. Anyone who wants to see nature left as it is has hundreds of thousands of acres of land in the fine state of Arkansas to roam and explore and I am one who has done my share of that with a group of young scouts eager to learn about our land and all the things that grow and walk on it.

Response to Comments in Letter No. 54

From: Roy Lloyd

Comment No. Response

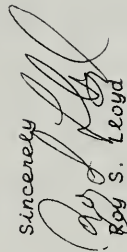
- A. Your support of Alternative D has been included in the content analysis of all comments received.

I fully support the need for leaving much of our land as it is without development or human interference, but I also believe that we as humans can live alongside the endangered species as well as the non-endangered. If we don't learn to do this, everything and everybody will become endangered at some point in the future.

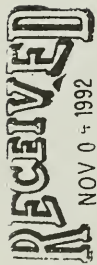
As for the fishermen, hunters, and other sportsmen who oppose this development, I wonder how many of these actually live in this city or county. I would venture a guess that most of these come from surrounding areas and have no actual vested interest in the mountain. Most of these so-called sportsmen are fishing with \$10,000 boats, high priced guns and equipment and invest high dollars in their equipment, then turn around and complain that their will be a fee for using this developed area. There are thousands and thousands of acres that will be left untouched for them to use without a fee.

I think humans can live alongside all creatures and we have successfully done so since the beginning of time. If people try to keep us from living as partners, we will forget how to do so and then all species will become endangered.

Sincerely



Roy S. Loyd



RESPONSE FORM

This form is being provided to make it convenient for you to respond and to provide comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: *APPEARS ADEQUATE*

Why?

Comments on Alternatives: *I PREFER "A"*

Why? *WITH EXISTING PIPES A SHULT DRIVE IN ALL DIRECTIONS, THERE REALLY IS NOT A NEED.*

Other Comments: *SEE ATTACHMENT.*

Why?

Name *Glenn R. Wilks* (First) (Mi) (Last) Organization _____
 Street *Rt. 1, Box 1435* City *Forsyth* State *AR* Zip Code *72055*

Please fold and return this comment sheet to:
 Greg Butts, Director
 Arkansas State Parks
 One Capitol Mall
 Little Rock, AR 72201

Response to Comments in Letter No. 55

From: Glenn Wilks

Comment No.	Response
-------------	----------

- | | |
|----|---|
| A. | Your preference for Alternative A has been included in the content analysis of all comments received. |
| B. | Your concerns about the pump station access roads and discharge of effluent from the waste water facilities are noted. Under Alternative D, the preferred alternative, the effluent will be hard piped to the 1600 foot contour on the south side before being released. The potential discharge into Shoal Creek has been eliminated from consideration under Alternative D. |

MR. CALY BUTTS, DIRECTOR
AR. STATE PARKS
ONE CAPITOL MALL
LITTLE ROCK, AR. 72201

GREEN WILDS
Rt. 1, BOX 405
PARKS, AR. 72155

DEAR MR. BUTTS,

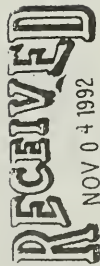
MY preferred alternative is alternative "A". I have heard all the arguments, but I still cannot see the justification of spending 13 million plus dollars of taxpayers money for "facilities" when the tremendous scenery is already accessible for anyone willing to make the trip.

The old lodge blended well with the surroundings, but my biggest worry is that the same planners responsible for the Eye-Sore called Owen Wilhelmina, with its petting zoo & railroad train, will ruin the relatively natural setting of this ~~the~~ existing landscape on the mountain. I am especially concerned about the access roads required for the water line pump stations to a virtually inaccessible area, and the sewer treatment plant that will release 16,700 gpd off the slopes. One of the ~~at~~ alternative sites would even discharge into Sharp Creek, the major watershed for the entire Mt. Magazine Dist. with at least two swimming holes.

The "tourist attraction" types boast that the Park will increase visitation to the mountain at least 5 fold. As a resident of the Caddy community, I do not consider this to be a desirable condition, especially with the many dangerous curves on Hwy #309.

Sincerely,
Alan Wilke

B



RESPONSE FORM

ARK STATE PARKS

This form is being provided to make it convenient for you to respond and to provide your comments on this DRAFT EIS; however, it is not necessary for you to use this form. You may use additional sheets if needed. Please help us by making your comments as specific and as meaningful as possible. Is the scientific analysis adequate? Do the Alternatives respond to your concerns?

Comments on Scientific Analysis: I WAS UNABLE TO ATTEND THE PUBLIC MEETING HELD SEPTEMBER 29, 1992 AT THE PARIS HIGH SCHOOL. I RECEIVED A COPY OF THE DRAFT EIS FROM A PARTICIPANT. AFTER REVIEWING THE EIS IT APPEARS THAT THE SCIENTIFIC ANALYSIS WAS ADEQUATE TO DETERMINE THE EFFECTS OF THE PROPOSED ALTERNATIVES.

Why?

A

Comments on Alternatives: AS A BUSINESSMAN I FEEL THAT ALTERNATIVE D WOULD BE BEST FOR THE DEVELOPMENT OF MT. MAGAZINE AND THE DEVELOPMENT OF THE SURROUNDING TOWNS AND COMMUNITIES. THESE TOWNS AND COMMUNITIES WILL DERIVE MUCH BENEFIT FROM TOURISM TO THE MOUNTAIN.

Why? THE POTENTIAL BENEFITS FAR OUT WEIGH THE LIMITED EFFECTS ON THE ENVIRONMENT.

Other Comments:

Why?

Name RICHARD SAVAGE, EVP Organization THE FIRST NATIONAL BANK AT PARIS
(First) (Mi) (Last)
Street 11 WEST MAIN, P. O. BOX 31 City PARIS State AR Zip Code 72855

Please fold and return this comment sheet to: Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

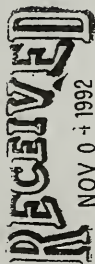
Response to Comments in Letter No. 56

From: Richard Savage

Comment No. _____ Response _____

A. Your preference for Alternative D has been included in the content analysis of all comments received.

October 31, 1992
Paris, Arkansas



Gregg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, AR 72201

ARK STATE PARKS

Dear Sir,

After attending the public meeting in Paris sponsored by the Arkansas Department of Parks and Tourism and the U. S. Forest Service I am writing to you concerning my views on the development of Mt. Magazine.

A I am anxiously awaiting the development of the Mount Magazine area. I have lived in the Paris area most of my life and I have missed having a lodge these past twenty plus years. The remark of not rushing into this development was the most abstruse statement that I hear that evening.

As a child my family always took our out of town guests to the mountain and lodge to "show-off" the beautiful place where we were privileged to live. The lodge was a great place to eat and enjoy the scenic view.

When I was a member of the Girl Scouts we rented cabins for outings. We cooked our meals in the cabin and always had a fire in the fireplace at night. Along with our leaders we took hikes to different points. This enabled us to study the wildlife, trees and vegetation to complete requirements for scouting badges.

During my teen years I worked as extra help at the lodge when there was a large dinner or banquet. The lodge provided excellent full time summer jobs for many young people. Many civic organizations used the lodge for meetings and dinners. Many class reunions were held there. It was a part of our memories of growing-up in this area and it has been missed by many former residents.

Other areas have nice facilities and are able to take full advantage of what nature has to offer. It has always seemed such a shame that we have been unable to get some development to replace what we once had. There are so many people that could enjoy a lodge. Not everyone is able to camp-out or wants to camp-out. Surely the people that oppose the development are not blind to the needs of others.

For the environmentalists, I have one question. Why is it

Response to Comments in Letter No. 57

From: Sue Lloyd

Comment No. _____ Response _____

A. Your preference for reconstructing a lodge and cabins on Mt. Magazine has been included in the content analysis of all comments received.

that we still have the endangered species, that they say will be destroyed, if we develop the mountain? The entire mountain was opened to the public for years and they have survived until now.

Please don't let a few eccentric people keep the majority of people from having facilities, so that everyone can enjoy "our" mountain again.

Yours truly,

Sue Lloyd
Sue Lloyd
210 East Chism Street
Paris, AR 72855
963-3938

October 29, 1992



Mr. Greg Butts
Director
Arkansas State Parks
1 Capitol Mall
Little Rock, AR 72201

ARK STATE PARKS

RE: Draft Environmental Impact
Statement for Mount Magazine
State Park

Dear Mr. Butts:

We have had an opportunity to review the 1992 Draft Environmental Impact Statement for Proposed Mount Magazine State Park and, therefore, offer the following as our comments in regard to the 1992 Statement.

We have attended a public hearing (in Little Rock) concerning the various proposals and views for the area within the Mount Magazine Ranger District of the Ozark National Forest. Each of the alternatives, ranging from No Action, to the highest level of activity (alternative E), as well as the alternative preferred by the Parks & Recreation Department, have been studied.

Let us first state we support the concept of the creation of a state park at the summit of the highest elevation in Arkansas. This has been a long time in coming and we acknowledge both the parks department and the U. S. Forest Service in supporting this concept.

The question, then, is not whether the park should be created, but rather what it should entail. It has long been our studied judgment that Mount Magazine represents a unique ecosystem different from that of the other developed mountain peaks in our state (i.e.: Mount Gaylor, Petit Jean Mountain, Mount Nebo, and Rich Mountain-Queen Wilhemina). As an example, there are plant species such as the Maple Leaf Oak that are endemic to the summit of this peak. Additionally, because of its remarkable elevated plateau (by standards in Arkansas), unusual climatological and corresponding planned communities have arisen. It is true this peak, at one time, was developed including a lodge. This lodge was destroyed by fire and, to a large extent, the mountain has reverted to its original primitive condition. It is our judgment this is as Mount Magazine should be today and tomorrow.

We both commented at the Little Rock public hearing on what an outstanding concept it would be if this could be the first State park in Arkansas to include a wilderness area within the park system. Our neighboring state, Missouri, has numerous state parks

Response to Comments in Letter No. 58

From: James Stanley, Audrey Burtram-Stanley

Comment No. _____ Response _____

- A. Your support of a State Park on top of Mt. Magazine has been included in the content analysis of all comments received.
- B. The maple leaf oak is no longer considered to be endemic to Mt. Magazine. It has been found in at least three other locations in Arkansas and Oklahoma.
- C. Section 2.3, Alternatives Eliminated from Further Study outlines reasons for eliminating the concept of creating a "wilderness". In addition, this concept does not meet the Arkansas General Assembly's decision to authorize Arkansas Department of Parks and Tourism to establish a State Park atop Mt. Magazine to provide facilities which, due to shortage of U.S. Forest Service funding, "no longer exist or ... have deteriorated beyond usable condition" (Act 884, 1983).
- D. The top of Mt. Magazine is managed as a U.S. Forest Service Recreation Area and is not included in the Special Interest Area in place on the mountain's slopes. While certain restrictions apply to management of a Special Interest Area, it is not considered "de-facto wilderness area."
- E. U.S. Forest Service Recreation Areas are considered unsuitable for timber production. Trees are cut in only a few instances. These include cases of insect infestation and disease, wildlife habitat enhancement, visitor safety, and recreation enhancement. Similar policies would be in effect if managed as a state park. Alternatives D and E propose restricted-use areas on top of the mountain. These areas would be off-limits to development and the general public.
- F. The effluent from the sewage treatment facilities will meet standards of the Arkansas Department of Pollution Control and Ecology and should provide no waste water contamination. There are no known sensitive elements of significance, either in individual species or terrestrial or aquatic communities, that would be impacted by either the water line or the waste water line on the south side. Effluent will be piped down to the 1600 foot contour before being released.
- G. Your preference for limited state park facilities and activities is noted. Please note no endemic birds are found on the mountain. Furthermore, none of the development alternatives propose hang gliding from Cameron Bluff. The effect of increased visitation under Alternatives B through E is discussed in Section 4 of the DEIS. With mitigation, no adverse effects on sensitive resources is expected.

Mr. Greg Butts
 RE: Draft Environmental Impact Statement
 for Mount Magazine State Park
 October 29, 1992
 Page 2 of 4

with wilderness areas comparable to the areas within the U. S. Wilderness Preservation System.

The Natural State's" Park System, unfortunately, has absolutely none.

Mount Magazine, especially the Cameron Bluff special interest area, has been recognized for its great value and preserved by the U. S. Forest Service as a unique geological area. Much of the mountain crest has been maintained in a de facto wilderness status although it has never been declared such by Congress. We believe any of the alternatives must include (and at the present time they do not) a provision that a portion of this State Park will absolutely remain wild and maintained as wild or wilderness area.

Apparently, there has developed a great deal of interest in the commercialization of Mount Magazine State Park as a "plastic and asphalt tourist destination site". We have no problem with this Mount Magazine site becoming a State Park, however, we must urge the Parks Department and Forest Service to define what this "tourist destination area" will entail. If it envisions the development of a substantial lodge, visitors center with convention facilities, numerous visitors, and ongoing activities, then we feel this is highly and totally incompatible with the ecosystem at Mount Magazine. Petit Jean State Park, which contains a much larger area at the summit, and Queen Wilhemina State Park have long been developed. These two major parks certainly are more than sufficient to constitute our summit state parks in the State of Arkansas. Additionally, there are numerous public facilities at the summit of Mount Gaylor and a state park at the summit of Mount Nebo as well. Four mountain peaks with this level of development are enough for Arkansas.

There should be certain Arkansas mountain summits accessible by motor vehicle with limited tourist facilities. These are, for the most part, preserved to enhance the unique natural phenomena at the top. Mount Magazine is such an area.

We do not support the "No Action Alternative" because this alternative would allow activities to remain as they are currently. This would include, of course, possible timber harvesting. There should be no timber harvesting in any state park except when it is absolutely compatible with and necessary to the enhancement of visitor interpretive values and recreational enjoyment.

Response to Comments in Letter No. 58

From: James Stanley, Audrey Buttram-Stanley

Comment No. _____ Response _____

H. Your preference for a "missing alternative" for stat park development has been included in the content analysis as "B (mod)".

Mr. Greg Butts
 RE: Draft Environmental Impact Statement
 for Mount Magazine State Park
 October 29, 1992
 Page 3 of 4

The most extreme alternative, Alternative E, would result in significant developmental activities. Some of the concerns we have in regard to lodge construction activities include the necessity of piping at least 700 to 800 gallons per day to 23,800 gallons per day, of waste water off the summit; this is in addition to piping water to Mount Magazine's summit as there is very little water there year round. This action would entail significant alteration of the mountain ecosystem and could possibly entail waste water contamination plus it is incompatible with such a remote mountain peak.

Arkansans should recognize the historical development on Mount Magazine and leave it for what it is; an archaeological phenomena of days past, not something to be recreated. A Visitor's Center is acceptable so long as it is compatible with the mountain's ecosystem. It should also exist to tell visitors about the interpretive features found on Mount Magazine (i.e., the flora fauna and what activities are available: (1) recreational hiking and rock climbing should be continued; (2) hang gliding, as of now, takes place off the summit; it may be continued if compatible with the park's other values. We believe it would be incompatible for hang gliding, and the sport's related activities, to take place on Cameron Bluffs. This is the site of unusual plant species and, most importantly, endemic birds make their rookeries).

It should be pointed out that under any of the alternatives other than A, there will be, through normal tourist and recreational promotion, increased visitor use of the park. A visitor's center and campgrounds would certainly encourage more visitors to Mount Magazine's peak. This will, per force, have a negative impact on the natural beauty and solitude of the summit. Some impact, we feel, is tolerable; but, such impact must be carefully controlled, monitored and not allowed to detrimentally impact those areas of the park that must remain forever wild and free. If such impact cannot be avoided, then we believe there should be no visitors center only primitive camping.

Our final concerns an important point. None of the alternatives really address the issue of a plan that would preserve Mount Magazine as a state park for its own intrinsic values.

Alternative A, which is a no action alternative, would basically continue the current situation (i.e.: no state park). The other four alternatives would envision the creation of a state park, but each, regrettably, would involve, to some degree, the establishment

Mr. Greg Butts
 RE: Draft Environmental Impact Statement
 for Mount Magazine State Park
 October 29, 1992
 Page 4 of 4

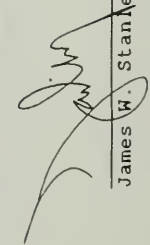
combination of both. There would be at least (4) one, perhaps two camping areas, (5) a single picnic area, and (6) significant utilities. Three of the alternatives would provide for (7) a conference center. All alternatives would provide for (8) a restaurant, meeting rooms, and cabins. Two alternatives would provide for (9) bath houses and (10) an amphitheater would be built. (We have no problem with the amphitheater as it would relate to the interpretive values of the summit. The other facilities would mar, in our judgment, the intrinsic beauty and forever scar the crest of Mount Magazine.).

H We believe the final Environmental Impact Statement must offer an additional alternative. This alternative would envision the creation of a state park, which we support. It would also envision the establishment of a visitors center, but would also establish a wilderness area within the park confines; (the boundaries of which would be determined in the final environmental impact statement). This new alternative would not provide for hunting, although hunting is now allowed. Hunting is totally incompatible with the use of a state park and must be prohibited. Activities such as rock climbing, hang gliding, and horseback use would be provided for, but restricted to designated areas. This land offers a splendid opportunity for nature studies, photography and telescope enthusiasts. Such facilities as tennis courts, pools, bath houses, meeting rooms, a conference center, with excessive outdoor lighting and signs, restaurants, and paved parking lots and sidewalks would, under all circumstances, be precluded.

In summary, we strongly urge you to develop "an additional alternative". It would preserve Mount Magazine in a primitive capacity, and as a state park. This property would not be like Petit Jean, Queen Wilhelmina or Mount Nebo, but rather more in the nature of White Rock Mountain, with generally primitive facilities.

State Parks are not created to produce a profit, but to preserve nature and to enhance the quality of our citizen's and visitor's

Very truly yours,


 James W. Stanley, Jr.

JWS/ABS:lms

CC: Lynn Neff
 Lisa Gandy

Response to Comments in Letter No. 59

From: Dr. Chris Carlton

Comment No. 1 Response

Dr. Chris Carlton
Rt. 5, Box 487C
Fayetteville, AR 72701

1 Nov. 1992

Response to Draft Environmental Impact Statement for Mount Magazine State Park, Arkansas Parks and Tourism:

Comments on Scientific Analysis:

I will limit my comments to my area of expertise, terrestrial invertebrates. To the extent that can be expected in a document encompassing as many subject areas as this one the ecologically sensitive, endemic, and rare invertebrates were dealt with reasonably well; a reflection perhaps of the depth of attention they have received in recent years by Dr. Robert Allen and colleagues. There were, however, a number of statements in the text where the authors interpreted the results of the past few years too loosely, or where more recent data should be taken under consideration. There is also at least one glaring inconsistency that is significant enough to be harped on regarding the development of sensitive invertebrate habitat.

Why? The statement suggesting that the rarity of *Arianops sandersoni* is more apparent than real is misleading (3.8.4.). Rarity in invertebrates is not measured exclusively by ease of collection. Known distribution and habitat requirements carry considerably more weight in assessing rarity. The statement that the north facing slope is the best habitat for the species is not backed up by collecting data and should be deleted. By any combination of criteria *Arianops sandersoni*, and its two Interior Highland congeners are among the rarest invertebrates in the region, a point that cannot be ~~over~~ emphasized. *Quachitichus parvulus* is consistently misspelled. In several places statements are made to the effect that the areas of Bear Hollow occupied by *Mesodon magazinensis* and *Arianops sandersoni* are outside areas being considered for development. To the contrary, Alternatives D and E include plans for a new trail across Bear Hollow and, more significantly, C-E include an alternative site for the lodge is directly uphill from Bear Hollow. The latter situation is totally unacceptable if Bear Hollow is to be preserved in its present, reasonably pristine state. The recent recovery of the endangered American burying beetle near the proposed development area should be taken into consideration, at least to the extent of prompting a thorough survey of the area.

Comments on Alternatives: I am a minimalist when it comes to development. Alternative C is the most enlightened approach. Arkansas is one of very few (perhaps the only) states that do not possess a biological field station. Alternative C addresses this void. I reiterate my opposition to the alternative lodge site above Bear Hollow for the reason stated above.

Other comments: Overall I was pleasantly surprised by the quality

A. Your opposition to constructing a lodge at the Bear Hollow location has been included in the content analysis of all comments received. The Bear Hollow site has been eliminated from consideration in the preferred alternative, Alternative D, in favor of the historical lodge site.

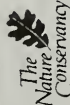
Your concerns for the species *Arianops sandersoni* have been noted. Please see Paragraph 3.8.4 of the DEIS for revised text that uses your comments.

B. Recent discoveries in Logan County of the American burying beetle, *Nicrophorus americanus*, a federally listed endangered species, have created interest in the distribution of the insect. The U.S. Forest Service conducted a nighttime pitfall trapping survey within the project area August 10-12, 1992. The survey did not establish the presence of this species within the project area. Additional information on this species has been provided in Section 3.8 and Appendix D of the DEIS.

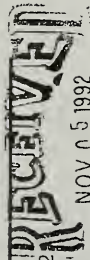
C. Your preference for Alternative C has been included in the content analysis of all comments received.

of this impact statement. My initial fears that any development on Mt. Magazine would be its ruination have been mitigated to some extent. I regret that, while its beauty and sensitive habitats may receive a measure of protection, an intangible quality of solitude will be lost, or at least be harder to find. People should at least be encouraged to keep quiet while on the mountain.

The Arkansas Nature Conservancy



November 2, 1992



Greg Butts, Director
Arkansas State Parks
One Capitol Mall
Little Rock, Arkansas 72201

ARK STATE PARKS

Thank you for providing The Nature Conservancy a copy of the Mount Magazine State Park Draft Environmental Impact Statement (DEIS) for review. The Conservancy commends the Arkansas Department of Parks and Tourism and the Ozark National Forest for the very professional manner in which the environmental analysis of the proposed state park has been approached by the agencies and their staffs.

A

The Nature Conservancy is unable to support the Mount Magazine State Park as proposed in the DEIS due to the potential negative environmental impacts to the rare species and ecosystem of Mount Magazine. Mount Magazine is a site of great biological diversity, with numerous rare and special concern plant and animal species known to occur. The Conservancy has expressed its concerns about impacts to these features throughout the process of developing the DEIS, during the scoping process, and in the Environmental Review Committee.

B

Our fundamental concern has always been with the potential impacts from projected annual visitation levels. The preferred Alternative D as presented in the DEIS is in fact visitation driven. The Arkansas State Parks position is that Alternative D is the only acceptable configuration for a Mount Magazine State Park, on the basis that Alternative D provides "the minimum facilities and operations required for economical year-round operation and maintenance of a state park." The major distinctive element of the preferred Alternative is high annual visitation; otherwise Alternatives B and C are not greatly different from Alternative D in general levels of most of the developments and facilities, as shown in the DEIS.

The position that only Alternative D merits consideration from the agency's operations standpoint means that visitation-producing facilities and developments are the primary consideration in the DEIS analysis, with analysis of environmental impacts being secondary to the requirement for a particular level of facilities.

The necessary operating size of units in the State Parks system is clearly a determination to be made by the professionals who staff the Division of Parks. The Conservancy is not expert in the operation of parks and recreational facilities. The Conservancy has staff expertise, experience and training in conservation and management of rare species habitats. On the

Response to Comments in Letter No. 60

From: Nancy DeLamar, Arkansas Nature Conservancy

Comment No. _____ Response _____

- A. Your support of Alternative A is included in the content analysis of all comments received.
- B. Mitigation measures addressing visitation have been further developed.
- C. Your inability to support development of a State Park on Mt. Magazine is noted. While we recognize it is not always easy to assess "potential negative environmental impacts to the rare species and ecosystem" we believe that Section 4.0 of the DEIS addresses the environmental effects of the proposed development.
- D. Arkansas State Parks has recently launched a program designed to raise public awareness of the financial needs of State Parks, to garner support for increased funding, and to explore alternative funding sources. The program identifies levels of funding needed to meet anticipated maintenance and operation costs, construction of new facilities within existing parks, and development of newly authorized state parks. Adequate operations and maintenance funding at Mt. Magazine is anticipated. Arkansas Parks and Tourism will not be taking on complete responsibility for monitoring and managing the resources of Mt. Magazine. This will be a cooperative venture between the U.S. Forest Service and the State Parks Division. In addition, other state agencies, such as the Arkansas Game and Fish Commission and the Arkansas Natural Heritage Commission, will likely be called upon to assist in certain management activities.

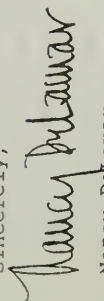
basis of our best professional judgement the Conservancy concludes that a high visitation facility on Mount Magazine is not compatible with the ecological resources of the Mountain. The Conservancy therefore cannot support the Mount Magazine State Park, as proposed in the DEIS, as long as a high visitation facility is a requisite of the proposal.

The DEIS does not adequately analyze the impacts of the long term annual visitation projected for Alternative D. The treatment of park use on page 4-38 of the DEIS states that "direct and indirect effects on the plant communities" are expected to increase as visitation increases. This is the point in the document where long term impacts of visitation throughout the State Park site should have been addressed, but the DEIS only discusses localized points of high pedestrian use. The DEIS has not accomplished its stated purpose, "to evaluate and quantify environmental effects" (Page 1-3).

The issue of future Arkansas Department Parks and Tourism budgets for maintenance and operations at Mount Magazine State Park, which was raised in the scoping process, is not addressed in the DEIS. The DEIS places great dependence upon on-site management and enforcement by the State Parks Division to implement the people controls described in the various development alternatives, as the sole means of mitigating impacts from users.

We appreciate this opportunity to review and comment on the DEIS.

Sincerely,



Nancy DeLamar
Vice President/State Director
The Nature Conservancy
Arkansas Field Office

REGION VI

NOV 02 1992

Mr. Lynn C. Neff
Forest Supervisor
Ozark-St. Francis
National Forests
USDA Forest Service
P.O. Box 1008
Russellville, Arkansas

Dear Mr. Neff:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA) and the Council on Environmental Quality regulations for Implementing NEPA, the Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (EIS) for Mount Magazine State Park, Ozark National Forest, Logan County, Arkansas. This Draft EIS describes options for the redevelopment of Mt. Magazine.

Five alternatives representing different development strategies on Mt. Magazine are evaluated. The Draft EIS indicates that the proposed project, Alternative D, provides the minimum size facilities and operations necessary for economical, year round, operation and maintenance of a state park. In addition to a lodge, cabins, restaurant, pool and conference center, this alternative provides for the following: a visitor information center, amphitheater, 19th century homestead, increased number of camp grounds and picnic areas, construction of a horse camp, etc. Also the Arkansas Department of Parks and Tourism would become responsible for the daily management of the park.

We offer the following comments on the Draft EIS for your consideration:

A The purpose and need of the proposed alternative should be developed further in the Final EIS. Promoting recreational use of the mountain is the primary need identified in the Draft EIS.

Numerous mitigation measures are identified throughout chapter 4 and are summarized on pages 4-56 to 4-59 of the document. However, there is no indication which measures will be implemented. Although a site specific plan for the state park has not yet been developed, the Final EIS should state as clearly as possible which mitigation measures will be undertaken. Also since a special use permit for development and operation of the park has already been

Response to Comments in Letter No. 61

From: B.J. Wynne, Environmental Protection Agency

Comment No.	Response

A. In response to your comment, the purpose and need of the proposed alternatives has been developed further (Please see the Executive Summary and Section 1.0.) In addition, subsections 1.4 and 1.5, entitled "Proposed Action" and "Decision to Be Made", were reworded to increase accuracy.

B. Your comments have been noted and used in text revisions throughout Sec. 4.0.

The Resource Management Plan mentioned in the DEIS is a requirement of the permit issued to Arkansas Department of Parks and Tourism by the U.S. Forest Service. Preparation of this Plan is not required under NEPA guidelines. However, it is standard practice to prepare State Park Management Plans. In the case of Mt. Magazine, where the cooperating agency is the U.S. Forest Service, it is likely that other state and federal agencies will be afforded the opportunity to review the Management Plan.

D. Environmental monitoring will be detailed in the above mentioned Resource Management Plan. Three types of monitoring will be carried out: 1) implementation, 2) effectiveness, and 3) validation. As the leasee, Arkansas State Parks would comply with applicable U.S. Forest Service regulations and guidelines.

The 19th century homestead would serve as a locus for interpretation of Mt. Magazine's rich cultural history. A modest living history program would be part of the concept. Included in the design of the homestead would be a small primitive cabin, a small garden, and perhaps an outbuilding. Including the parking area needed to service this facility, total acreage affected will not exceed 2 acres. A total of five acres were surveyed at each of the two proposed locations. Please note that additional information regarding this facility has been included in descriptions of Alternatives D and E in Section 2.4 of the FEIS.

The Forests do not have a Programmatic Agreement with the SHPO at this time, so compliance with NHPA Section 106 is done in accordance to CFR 800 regulations. Paragraph 3.9 of the DEIS points out that a cultural resource field survey was conducted for all alternatives within this project and preliminary National Register evaluations were made. The survey report will be submitted to the SHPO for their compliance review and comment by the end of calendar 1992. This process will be completed and the review letter incorporated into the FEIS. Mitigation measures are addressed generally in Section 4.7 of the DEIS, but specific mitigation will have to be developed through a Memorandum of Agreement with the SHPO and ACHP on a site by site basis.

issued, by what means does the Forest Service insure compliance with specified mitigation? The Final EIS should address this matter.

C The Draft EIS states that if a state park is established, a resource management plan will be completed within two years. Is this plan distributed to agencies and organization for review and comment? Please provide additional information about this plan in the Final EIS. As a matter of information, EPA would like an opportunity to review this plan.

D Environmental monitoring by state and federal agencies is an activity identified for Alternatives C, D and E. Please describe the type of monitoring anticipated and the specific role of the agencies in the Final EIS.

E A 19th century homestead is a proposed feature of Alternatives D and E. What exactly is proposed and what purpose does the homestead serve? The Final EIS should include additional information on this feature.

F Cultural resources, some of which are potentially eligible for listing on the National Register, will be impacted by development of the mountaintop. While coordination with the State Historic Preservation Officer and the Keeper of the Register is addressed, there is no mention of coordination with the Advisory Council on Historic Preservation. Does the Forest Service comply with Section 106 of the National Historic Preservation Act by way of a Programmatic Agreement with the state agency? Please address this matter in the Final EIS.

G Alternative D will increase employment by 141 persons in the short term and 119 in the long term. Will this increase have any impact on nearby communities? Also the Draft EIS states that visitation will increase from 43,000-47,000 to 227,000-246,000 persons per year. What socio-economic impacts are expected from this dramatic increase?

H According to the Draft EIS, there will be a loss of prairie or glade-like openings or clearings in the juniper-woodlands, a loss of openings in the scrub oak woodlands and a loss of sphagnum seep communities under the No Action Alternative. Please describe in the Final EIS how these communities and openings will be managed and maintained under the action alternatives, particularly Alternative D.

I The Mountain's springs, which provide habitat for plants and animals and have excellent water quality, are described in the Draft EIS. We recommend that these special aquatic sites be avoided to the maximum extent practicable during the construction phase. Based on this recommendation, additional information on this resource and probable impacts should be included in the Final EIS.

Response to Comments in Letter No. 61 (Continued)

From: B.J. Wynne, Environmental Protection Agency

Comment No.	Response
G.	The economic impact from the estimated increased short-and long-run employment changes, as well as the effects from the estimated increase in visitations are presented in the estimates of changes to retail sales figures and other economic variables presented in the DEIS, including its Appendices.
H.	Active vegetation management will be maintained through prescribed burning, mechanical removal, or a combination of the two. These activities will preclude loss of these successional habitats through encroachment by woody vegetation.
I.	The largest springs on the mountain are located on the north slope below the bluffline with the exception of the spring at Brown's Spring Recreation Area. All of these springs are outside the areas of proposed park developments. Several very minor springs are known within the general areas of proposed development, and they will be protected to the maximum extent practicable during the construction phase.
J.	The effluent from the water facilities will be hard piped to the 1600 foot contour before being released, which will effectively remove it from the special interest area.
K.	Arkansas State Parks will make application for a stormwater discharge permit from the Arkansas Department of Pollution Control and Ecology and will fulfill all permit requirements.

3

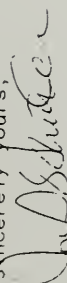
J The Draft EIS states that the effluent from the wastewater treatment plant may be hard piped to avoid discharging treated wastewater into the special interest area. When will the decision be made about the need for this mitigation and what impacts will be avoided by implementation of this measure? A clarification of this point is needed in the Final EIS.

K As a matter of information, construction activities disturbing more than five (5) acres requires a permit for stormwater discharges from the Arkansas Department of Pollution Control and Ecology. The Final EIS should address the requirement for this permit.

In accordance with EPA's policies, we have rated this Draft EIS as EC-2 (Environmental Concerns--Insufficient Information). Our concerns and the additional information needed in the Final EIS are discussed above. Our classification will be published in the Federal Register according to our responsibility under Section 309 of the Clean Air Act, to inform the public of our views on proposed Federal actions.

We appreciate the opportunity to review the Draft EIS. Please contact Ms. Darlene Coulson of my staff at (214) 655-2260 for further explanations of our concerns and comments. We request that you send our office two (2) copies of the Final EIS at the same time that it is sent to the Office of Federal Activities, Environmental Protection Agency, 401 M Street S.W., Washington, D.C. 20460.

Sincerely yours,


B. J. Wynne
Regional Administrator

Appendix G:

Part IV - Responses to Formal Statements

Mt. Magazine DEIS Public Meeting

Little Rock, Arkansas

22 September 1992

Little Rock Meeting - 22 September 1992

#1 - Arthur Trusty

My thoughts are on Issue Two on the paper we have here (the Executive Summary). As you know, like he stated in the film, Mt. Magazine was populated in the mid-1800's up until 1920 when the people moved away. All these farmers worked several acres of land. All had many livestock, and all let their hogs run wild. All these bugs, plants, and everything came through this period of time which is 70 or 75 years. So, my thought is, there is no way that a few acres of land up there now would in any way endanger any of the species, plants, or anything that is on the mountain now. So, I don't believe this issue should be any way used to keep from building a park on Mt. Magazine.

- A. Your support of developing a park has been included in the content analysis of all comments received. Thank you for your comments.

#2 - Representative Frank Willems

Thank you, Mr. Graves. Of course everyone wants to know who I am, I think. I am Frank Willems, State Representative, better known as the representative of Mt. Magazine. I think Mr. Trusty made a very valid point that I won't even expound on because it stands to reason that if these bugs and whatever are indestructible then I know of many times that I have caught those rascals whipping around my chiggers, eating my legs, and the mosquitoes working on the other end. I have decided they are indestructible. But one of the points I want to make in this plan D. I think that not many people, and you young folks don't know it now but sooner or later you're going to get like some of the rest of us might be. It calls for places so that older folks can enjoy the beautiful sight of Mt. Magazine. You know there are some older people that still love Mt. Magazine. I heard a nice story just yesterday and today from my friend that mentioned something about a man and his wife were married and went on top of Mt. Magazine and celebrated their honeymoon on Mt. Magazine. What a wonderful situation that was. Now these same people are getting along in years. They still would love to go up on top of Mt. Magazine and enjoy it, the beautiful Mt. Magazine that it is. Which, by the way, I took my sister, my nephew and his wife up, and I keep myself being very, very thrilled and wonder at the goodness at God that he allowed such a beautiful place to be built so that the rest of us might enjoy these heavenly gifts that's given to us. Not without anything that we have to pay, but we do owe it to ourselves to take care of it, so that's why we are here. We're here to see to it that not only the environment is protected, but the flora and fauna is protected upon the mountain, that people who intend rather than to take care of property will trash it, will make it look more like a dump rather than a scenic view that we are so used to when we go up on Mt. Magazine, and I'm sorry to say that there are those and we just don't believe that's the way we should be doing it. I think that one of the reasons, the biggest reasons that we want to see Mt. Magazine made into a state park is because it will be patrolled and not left as it is now, unprotected, because we just have one person on the 100,000 acres and preservation area of the Mt. Magazine from the Forest Service. One person is designated, I think if I'm not mistaken, to protect the property upon Mt. Magazine. You know that is impossible. You know that he cannot do that. So, when, I say when, it is made into a state park, there will be people protecting it. So, I see no reason why I should go on and on because I think all of us that are here surely know about Mt. Magazine, know how the beautiful spot that it is, that all of us feel the same way that we want

to protect the top of the mountain. We want to protect the sides of the mountain. We want to protect and have everybody, as Mr. Trusty said, have the chance to enjoy this great beautiful scene that is Mt. Magazine. So, let's go on with it. By the way, one of the things that I've had to do, and I enjoy doing it and I hate to turn loose money worse than anybody, especially state's money, but we did use \$200,000 from the state coffers, which you and I know is hard to come by, hard to turn loose of, needed so much in so many places to help the people in the state of Arkansas, and especially the people that frequent Mt. Magazine to have this study completed, we felt we owed it to the rest of you. Thank you.

A. Your support of Alternative D has been included in the content analysis of all comments received. Thank you for your comments.

#3 - R.N. (Butch) Wade

I have great respect and admiration for Representative Willems. He has been at this project for a long time. Ron, Randy, Greg, Stan, I've known these guys for many years. They don't lie, they don't cheat. They don't do the wrong things. They stand for the right things, the things that we need done. I don't know how in five minutes I could tell you what 25 years of work has been like or the involvement for 25 years, but I will try to give you at the machine gun rate my feelings concerning Mt. Magazine. In the past, it's provided employment, recreation for citizens of our area, people activities. In 1983 I was Chairman of Parks and Tourism Commission when we took this into the state system as a state park. I know the park system and I know they do not go in and change and ruin areas. They make them better. They make them usable. They protect them, they have a God-given job to protect the environment and protect our natural areas. They do not build things that are not compatible with nature. They in fact spend their lives - Bill Paxton, you know, they spend their lives building the things that are good and that are compatible. Our future, the past, our present and our future, our future. We are talking about 141 jobs. I represent the Mt. Magazine Association. I represent the guy that works at the service station, the factory worker, the people that works at the school, our school system. There would be tax revenue from this to educate our young people. There will be jobs for our young people to work at and make extra money. Hopefully to go to college. The school children that will be allowed to go from our school to that mountain under the direction of state parks that has such a wonderful program showing them the natural things and the nature tours and walks. And show them about the bugs and the beetles, the trees and the leaves, and the things that we want them educated on so that they will protect them in the future generations. This will open that up to happen for our young people. Education is the key to environmental protection, not laws and fines and pressures. It's education. We educate them, and they'll protect it, they'll take care of it. We have a lot of young people here today. It's up to you to protect it, but it needs to be under the hands of those people that know the methods, that are educated to do it, so you can be educated to do it. It truly believe that if you are here under a frivolous mission, if you feel frivolously about this project, if you feel like this is just something I can be against and maybe I can get a little publicity or notoriety, I ask you to leave. I ask you to not speak out and hurt something that is so critically important to not only our economy or future generations and our life. I have been at this project since 1967. Do you think I would want that area hurt? Never. Not in your wildest dreams would I want anything to hurt it. I want to protect it. But, we can protect it, utilize it, and have it there for future generations under this Alternative D that has been so carefully analyzed and put together in such

a way that we will all benefit and it will be there for years and years to come. I thank you very much, and I appreciate the time.

- A. Your support of Alternative D has been included in the content analysis of all comment received. Thank you for your comment.

#4 - Jim Rawlins

My name is Jim Rawlins, and I am a member of the Sierra Club. I'm not here frivolously and I'm not taking your invitation to leave without speaking in opposition to Alternatives B, C, D, and E. The Sierra Club studied this about four years ago, I believe. Mr. Graves, when you came to the Game and Fish? Three years ago and made a presentation to the Sierra Club then. We looked at everything you had; the slides and we have read now your environmental impact statement and appreciate that work that you have shown here. We have not reconsidered, at this point, our opposition to developing the facilities at Mt. Magazine. It is in the process of being studied and we will let you know after we have had a chance as a group to study this more thoroughly. Our position as of today is as it was three years ago. We've not seen any reason to change our opinion that God's creation, sometimes, is left best like God made it.

- A. Your preference for Alternative A has been included in the content analysis of all comments received. Mt. Magazine as we know it today is a result of man's influence on the environment. Sections 3.6 and 3.10.1 describe the rich history of development, clearing, farming and recreational use of the Mountain. Alternative A (No Action, No Change Alternative) does not reflect the pre-settlement conditions which you may be referring to as "God's creation ... like God made it". Thank you for your comments.

#5 - Tony Morris

I appreciate the opportunity to express my opinion concerning this proposed development. And, I'm not here frivolously either. I didn't have a lot of time to look over the document, as I only received it last week, but I will be sending in a written comment in a little greater detail. I was disappointed to see the large concentration of structures located in one of the areas with the most endangered and threatened species, namely on the southern side of the mountain above the cliff face there. I feel like a better location for the structures would be in the pine plantation on the east end of the mountain. We've got plenty of pine plantations on public lands, and I feel like this would be a better location. I'd like....I lost my train of thought. I'm sorry. I think the Alternative D includes a lot of facilities which would be better off left off of the mountain. The 19th century farm, the residences, that type of structure could be left off the mountain and it would, in my opinion, improve the aesthetics of the proposal. I think there should be some provisions for primitive camping that's free. Public land is public land and I would hate to see people have to, everybody, have to pay for enjoying this beautiful spot of Arkansas. I'll get my thoughts together a little better on my written comments and like I said I haven't had a good chance to look over the document in detail. I was concerned with some of the statements in the document. There seem to be some contradictory statements, and some statements that were not supported by the data. And, I will do a better job with the written comments. I appreciate this chance to make a written, or an oral comment. Thanks for your time.

- A. Your preference for changes in Alternative D have been noted. Thank you for your comments.

#6 - Rick Oliver

I appreciate this opportunity to speak again on behalf of Plan A and E [sic], it's fine with me. The B, C, and D can take a hike. The economics in the area are not so great. We are all aware of that. On the bottom of page 6 it points out that the population has dropped off dramatically. The total and per-capita income is way low, lower than the state average. The majority of the population are these folks, and they are good folks. They're agricultural people. What we are looking at here, as the Representative stated, these heavenly gifts that we have. I think that with these plans, B, C, and D, we are trying a desperate attempt to generate economic growth in the area. I think that we should take care of business there and spend this money on education. We're not going to make a zillion dollars up there. You can't get this many people that you propose will visit the park, to go to Razorback games. I just think that we can develop areas that will cause no impact on the environment and the area whatsoever, and that's my point of view and it's very important to me. Thank you.

- A. Thank you for your comments.

#7 - Bill Paxton

Good evening everyone. I worked with a lot of you people in the last couple of years on this project. I used to work for State Parks for a period of time in the infancy stages of this, back during the 80's. Some of the things I would like to point out, having worked on it earlier, is that the plan seemed to be a clear, concise, well written plan. It seems to achieve a balance between the desires of those people wanting to develop and use it for recreational purposes and those people who want to protect it. Nothing ever changes. Nothing ever stays the same in this world. More and more people come into, more and more people in the state. Use is going to increase on the mountain whether or not the changes are made. I for one prefer to see that it be supervised. I think that the plan addresses the concerns of the Forest Service and state parks. It also addresses, in response to the substantive issues and concerns, of other federal and State agencies and to those of the public. Some of the things that were specifically mentioned about economics. The issues themselves. One of the things that State Parks has to do is you can't be a drain on the State Treasury. It needs to bring money in to operate; everything is not free anymore. It provides income and employment opportunities for an area that is pursuing a type of rural development that is not smoke stacks. They are basing the development that they are talking about on the natural resource base. They're protecting natural resources. I think it is a way of the future in Arkansas rather than things like chasing smoke stacks and building factories in places like Booneville, Paris, or even out in Lonoke County or anywhere. Recreation - enhance opportunities for public use, recreation, education and research. Environmental protection - it's improved by 24-hour day presence on the mountain. I disagree with the gentleman about having the residences up there knowing how long response time is to a fire and to an emergency. So, that's why they have rangers in places with facilities there so it takes less than five minutes to get to the problem not twenty-five when somebody's life is in danger. Special areas set aside for protection, treatment of water, sewage on top of the mountain, PETS impacts and human use. They are not really controlled at the present time. On the Magazine Ranger District there is one individual who is a law enforcement person

responsible for the 100,000 acres in that district. Mt. Magazine is just one place he has to patrol. There is a lot of unsupervised use. I've seen what happens up there. I think that even some of the scientists have been the enemy as well in collection of some of the specimens. The special area set aside to protect some of the sensitive species - the presence of man is needed for certain species like the pipewort and the rufous-crowned sparrow. If there wasn't fire brought into the ecosystem, those species would not survive. Development and location of the sites - I think that the fact that they are planning to build or proposing the facilities at certain sites that have already been impacted is the way to go, with minimal impact to the existing resources up there.

Changes or modifications I'd like to see made to Alternative D. There were two hunter accesses that I think at one time there were four proposed. I would suggest that Cameron Bluff trail access also be designated a hunter access for going off the mountain for those people that pursue that persuasion. The rim trail is a viable alternative, with the appropriate mitigation measures and proper construction techniques.

I suggest that the lodge be located at the original site. The original planners that chose that site, chose it for a reason: for the view, the location. It's also the least environmentally-damaging and from my point of view rather than going to an alternate site on the other side of the mountain with no view and going tearing up another place.

Retain the hang gliding area for hang gliders only. I don't see grouping the astronomical area with it. I think that area should be a little further east toward Mossback Ridge. The 19th century home place. I would suggest that the preferred site be for that at the alternate lodge site rather than near the present lodge location. The last thing is I'd like to see us do some evaluation of wetland sewage treatment application in some of the more dispersed areas of the mountain. I think that those things are being tested at Tennessee Valley Authority, the Forest Service has looked at them, the City of Booneville is using those as well. It's a great way to sort of be natural in a way, to recycle your waste and use it for a positive situation. So those are my comments. Thank you.

- A. Your support of Alternative D development has been included in the content analysis of all comments received.
- B. Your preference for changes to Alternative D have been noted. Please note. Designating the Cameron Bluff trail access as a hunter access to the slopes of the mountain was not considered due to the fact that an acceptable alternative exists (Green Bench Road). Also note that while designated astronomical observations areas are proposed under Alternatives D and E, no specific locations have been identified by the EIS.
- C. Your preference to construct the new lodge at the old lodge site and to construct the 19th century homestead at the alternative lodge site has been included in the content analysis of all comments received.

Appendix G:

Part IV - Responses to Formal Statements

Mt. Magazine DEIS Public Meeting

Paris, Arkansas

29 September 1992

Paris Meeting - 29 September 1992

#1 - Greg Hollis

Good evening. Excuse me if I turn some awesome shades of red up here. I'm not used to public speaking. My name is Greg Hollis. I work with the University of Arkansas at Fayetteville and have been visiting Mt. Magazine since 1979 when I first camped out up there and have found many different ways to enjoy the mountain. I'm just here to speak for those who'd like to see a happy compromise between the developers and current users of the mountain. You all know who you are and what you do and what you enjoy about the mountain. What I'm worried about is the State of Arkansas is condemned to repeat history by developing something that has failed if not once but twice in the past. It has not been developed. The species that are up there now that the environmental impact is concerned with. I am not really worried about them. These people seem to be taking care of the situation. Any development seems to have been worked around the species. The species have survived several developments in the past. One of the things I take personally about the mountain is I enjoy rock climbing. In rock climbing there is a rebirth, a real excitement going on with lots of people. People who want to learn to rock climb and people who want to spectate and watch rock climbing are coming around to various places all across the nation. One of the things that Mt. Magazine has to offer to this state. People drive from 500 miles around to enjoy climbing at Mt. Magazine. It is good solid sandstone. It's one of the premier climbing areas of the state. In evidence of this, this is called Rock and Ice Magazine. It is a publication for rock climbers. This is dated February of 1991, and in here is mentioned Mt. Magazine under the title of Razorback Rock. It lists a guidebook. There is now a climbing guide for that area. There can be a happy medium between climbers, hang-gliders, mountain bikers, and other people who enjoy the sporting aspects of the mountain are to develop the alternative location. It seems to have the least amount of impact on not only the species that are threatened, but the current users will not be inconvenienced. It would be there on the main highway, where, when I see visitors on the mountain who are lost, that is where they seem to congregate there by the information bulletin board. All who have asked for a lodge or a place to stay in town. I've had to go back down to Paris. I think they would enjoy having a lodge up there, a small lodge, not full blown. I don't think \$14 million or 13 million dollars of the state's money is best suited on top of Mt. Magazine. Several million, okay, we'll take it, water, electricity, public bathrooms would be real nice. Small development. Alternative D, I think, is a little large for the scope of the mountain. It is a small mountain with a small area. Twenty-two hundred acres sounds like a lot but it's really not, and it's easily travelled. What I would like to see is a small lodge on the eastern side of the slope over Bear Hollow that is completely accessible to the handicapped with trails and everything up to the American Disabilities Act, which I am sure these gentlemen are fully aware of and have to deal with. The park has the opportunity to be a site for these people also. I appreciate you all listening to me. Thank you.

- A. Your preference for less than Alternative D development, and your support of a small lodge at the alternative lodge site has been included in the content analysis of all comments received.

#2 - Ms. Charlotte Davis

After study and research of the alternative proposals for Mt. Magazine development the Paris Rotary Club enthusiastically endorses Alternative D with only one exception, item 12. We propose that in the best interest of visitors to Mt. Magazine the cabins should include kitchen facilities. Many of the areas covered by this alternative are of special interest to us and we appreciate the involvement and hard work of so many to assure the development of Mt. Magazine.

- A. Your preference for Alternative D has been included in the content analysis of all comments received.
- B. Your preference for cabins with kitchens prompted us to delete all references to cabins without kitchens.

#3 - Mark Huber, Alderman for City of Paris

In regards to the redevelopment of Mt. Magazine I would like to relay the concerns and responses I have heard from the people of Paris.

The first and foremost concern was the protection of sensitive or endangered species. The general consensus was that Alternative D provided the protection to those species far and above that which is present at this time, and would continue to protect in the future. The second most voiced concern was the utilization of the park to the full benefit of all. Again, Alternative D offered the necessary facilities and areas that would provide all with the opportunity to enjoy the park. The third concern was the assurance that a continued presence of park officials would be maintained to provide educational information, adherence to rules, and help if needed. Once again Alternative D provided for these concerns.

We believe that great care has been taken in considering the redevelopment, years of study on the impact of the habitat and in the usage for education, and entertainment of the general public have led to the best solution, Alternative D.

We also believe that Arkansas has the best State Parks in the nation, and that judging from that record we are assured that management of the Mt. Magazine State Park will be second to none.

Our thanks go to all that diligently worked so hard for so long to provide us with the prospect of soon enjoying our mountain to its fullest.....again.

If there is anything I or the City of Paris can do to expedite this proposal please contact me. key in his letter

- A. Your support of Alternative D has been included in the content analysis of all comments received.

#4 - John Williams

I'd like to thank everyone who has participated in this process. I want to speak to you a minute as an individual and as a member and some sort of official of Mt. Magazine Association. I want to say, I/we strongly favor rebuilding the lodge, restaurant, cabins, and improved campgrounds. I've studied the Draft Environmental Impact Statement and feel FTN has adequately and, in fact, very well addressed all the pertinent concerns about the effects the rebuilding process may have on the environment. We also strongly favor Alternative D. Of course, I personally favor the reuse of the old lodge site. I think it's far enough off the cliff it wouldn't interfere with any use that may be down on the rocks. We, of course, realize from what we have seen and heard that rufous-crowned sparrow habitat near the old lodge site can and will be protected during the development process. Through this process, a particular concern is that the lodge facilities be built with minimum negative impact on the environment. State Parks in cooperation with the National Forest Service is our best hope to make sure it will be done right. Campers love the mountain. Hikers love the mountain. Bird watchers love the mountain. Hang-gliders love the mountain. Horseback riders love the mountain. Rockclimbers, tourists and those other folks love the mountain and want to work together to see that this building is built and the mountain is preserved and will stay beautiful and unique place that it is. Thank you.

- A. Your preference for Alternative D has been included in the content analysis of all comments received.
- B. Your preference for constructing the new lodge on the old lodge site has been included in the content analysis of all comments received.

#5 - John Flatte

My name is John Flatte. I'm a hang-glider pilot from Fort Smith. I love Mt. Magazine. I spend a lot of time up there camping and I don't have any problems with development on the mountain. Personally, my main concern is the impact on the wildlife that is up there. I personally witnessed a pileated woodpecker. I've stood 10 feet from a black bear. I've flown with a bald eagle. I've really enjoyed being up there. Anytime you have a bureaucracy that's going to be in control of something you personally like to do, you are going to have conflict. My main concern is that the people who are going to oversee the hang-gliding be able to make good decisions concerning our sport. I've heard stories in the past where they just weren't educated enough to make good decisions on something that we really know about. I'd just like to have some assurance that they would work with the pilots. We are all members of a National Association and we have guidelines and rules. I am not opposed to development. I would hate to see the pressure on the land. That really seems like a whole lot of visitors. That's about all I have to say. Thank you.

- A. Your support of developing facilities on Mt. Magazine has been included in the content analysis of all comments received.
- B. Your concern for effect on wildlife and opportunity for hang gliding have been noted.

#6 - Matt Gallagher

My name is Matt Gallagher and I am representing the Arkansas Herpetological Society. We at the Society have a problem with the EIS; the entire EIS. After reviewing it, both I and several other people have come to the conclusion that it is not done correctly. The EIS has chosen to ignore the ecosystem that the mountain sits in. The 2200 acres on top of the mountain are just a small piece of that ecosystem. Anything that happens there is going to affect what's around the mountain. We have already heard said tonight that there would be no adverse effect on the shagreen snail because of what is going to happen on top of the mountain. I cannot believe that. The shagreen snail is going to be affected no matter what happens. Other problems with the EIS are the data that is contained therein. There is citations of data from our Society, the Arkansas Herpetological Society, that are false. We did not give that data, and we did not provide the data that we are accredited with. The best thing I can say is that if you take the EIS for what it says, then we can stop the development tomorrow. There is one species listed as a herptile species on the mountain that doesn't occur anywhere in the state of Arkansas, doesn't occur anywhere north of the Coastal Plain in southern Mississippi and it says that it is on the mountain. If it's there we can shut it down. OK? If we are going to do this right, and I think we ought to do this right, then let's do it right from the start. I'm just afraid that the EIS has been ram-rodged through in order to get this state park on the mountain as fast as possible. It's going to be there. I am not going to fight that. I realize it will be a state park, but we have got to do it right if we are going to do it. Thank you.

- A. Ecosystem size varies by its components. The social part of the ecosystem includes those counties or parts of counties in which the effects of a given project are identifiable. Likewise, the project affects the biological community of the mountain, as opposed to that of a 5-county area. Surveys and studies deal with the affected environment - not that environment reasonably beyond the reach of the effects.
- B. The Magazine Mountain shagreen is a terrestrial species found on slopes of the Mountain, and there is no indication that it will be affected by activities on the top of the Mountain.
- C. The data referred to was taken from an article in the 1989 issue of the Newsletter of the Arkansas Herpetological Society.

#7 - Keith Olsen

First of all, my name is Keith Olsen. I'm speaking to you as a past president of Booneville Chamber of Commerce and I have done quite a bit of work on Mt. Magazine in regard to helping your study with being Chairman of the Booneville Sewer and Water Commission. I want to thank you all very much with what you have come up with. In my opinion, the perfect alternative to the Mt. Magazine development. Another person I would like to thank very much is a man who I call the iron horse and that is Frank Willems. Frank, I know..... Another thing I would like to say is that I am in full support of what your study has shown. I think you have done a thorough job on it. I know what work you have done because I have had a lot of phone calls on different things that have involved the mountain, like the waterline and everything. The

other thing I'd like to bring up in this meeting that I haven't heard much about it....I have traveled the United States and one of the greatest National Parks that I have ever been in is Yosemite National Park. Mt. Magazine, no matter how grand we think it is, cannot compare to Yosemite National Park. There is rock climbing going on there year around. There are spectators that watch it. Millions of spectators watch that every year up there. Hang-gliding. I never get up at the crack of dawn. But I get up when I go to Yosemite National Park. Hopefully, the study that you all have done will cooperate well enough with the hang-gliders, the campers and everything where this will be a paradise for everyone. I've heard this about the snail. I've lived in Booneville, Arkansas since I was three years old. I have been on Mt. Magazine hundreds of time. There has yet been a person here to show me the snail and if you don't put something up there nobody is going to see it to know what we are even talking about. Thank you.

- A. Your support of Alternative D has been included in the content analysis of all comments received.

#8 - Charles Selman

My name is Charles Selman. Thank you for the opportunity to speak tonight. Several comments have been made about the speed at which this thing has been going and it kind of reminds me of a story. There was a retired soldier here a while back. When he got out of the University at an early age he was stationed in Mountain View, Arkansas. Where Ms. Karen Lackey, one of our Commissioners drove down tonight from. Of course you didn't have any television in those days. Radio reception wasn't any good. And they didn't get newspaper delivery. And some of those folks only came into town about once every six months to get some provisions to take back out to feed the family. Of course when they got home all the neighbors gathered around to find out what was going on in the world. Well, this old boy made his semi-annual trip, got home and sure enough all the neighbors gathered around and wanted to know what was going on. He said, well he found out there was a young man by the name of John F. Kennedy running for President. He was a Catholic. And he heard, rumor was that he kept holy water in his commode. One of his neighbors said, "What's a commode?" He said, "Hell, I don't know. I ain't no Catholic." It does not appear to me that this thing has moved too rapidly. And I think everyone who has reviewed your studies agree with your Option D as an alternative. I don't see anything wrong with it. I don't think there is anybody in Paris that I have talked to, or in the State of Arkansas, that has any opposition to it. Thank you.

- A. Your support of Alternative D has been included in the content analysis of all comments received.

#9 - Mark Stump

Thanks. I'm Mark Stump from Rogers, Arkansas. I spoke here before representing the Ft. Smith Hang-gliding Association a couple of years ago and appreciate John Flatte's comments. I'm here tonight to try to represent a group that I feel like I'm the self-appointed head of. And that's the people that camp at Mt. Magazine almost every weekend. They might not be here tonight. If they are, there is very few of them. They have to drive a long way to camp at a

special place that is primitive. It is a no-fee area, and they like it the way it is. The pictures that Rob showed of people on the mountain. They're up there because they like it how it is. I think some development is good. But, I also believe that there should be some places where the people can go that they don't have to pay. They're going to be the casualty of this development. There will no longer be free camping on Mt. Magazine. It will become a \$10 a night campsite just like all the state parks. I believe there is a way to bring tourism and economic development to the top of the mountain with maybe development of the lodge. But, please do not exclude the people who are camping u there and enjoying the mountain for that purpose. There is no such place as a no-fee area in the state parks, and I just appreciate the Forest Service for allowing us to have the use of it that we have for the last 14 years, fighting fires with them, looking for lost campers and just having a great time. So, think about an alternative for people to the people who camp 30-60 nights a year. Thank you.

- A. Your preference for free camping has been included in the content analysis of all comments received. Please note. Free, primitive camping is allowed on approximately 90,000 acres of undeveloped land in the Magazine Ranger District.

#10 - Bill Grist

Thank you. I am Bill Grist, Logan County Judge. I appreciate the opportunity to get in here and talk to you a little about this. I think Plan D is a very good plan. I haven't had much time to go through it a lot, but what I've seen I like. So, I ditto, Mark, your comments. I guess that "D" stands for ditto. It's good to see everybody out here. The crowd, the number of people here shows your interest. I hope you stay interested in the program. I hope you help to see it through. If there is anything, any time, that anybody needs out of the Judge's office, either Booneville or Paris, just give us a call. We'll be glad to help. Thank you.

- A. Your support of Alternative D has been included in the content analysis of all comments received.

#11 - Stewart Scoggin

Thank you. I am Stewart Scoggin, Superintendent of Schools in Booneville. And, again I would like to echo what the people before me have said. Looks like to me there's been a lot of work that has gone into this process. And, that we support the development of Mt. Magazine. And I guess that as much as anything else, I'm an advocate for the young children of this area. One only has to travel to state parks in our beautiful state. I'm a native of Murfreesboro. They have an excellent interpretive program down there. I'm a former Interpretive Ranger with the Corps of Engineers and I guess some of the most warm thoughts that I have are working with young people. I think many times the Interpretive Rangers and staff can show what is beautiful, what God has put here on Earth for us to enjoy. The said thing, Mt. Magazine as it is now, very few young people without an interpreter really can't see the joy and, really, it really hinders what I think the potential is for young people in Arkansas. So, I would definitely support this. And, it is good that Paris and Booneville can enjoy and agree on something.

- A. Your support of Alternative D has been included in the content analysis of all comments received.

#12 - Jewell White

I relinquish my time to someone else, except that I am for Alternative D, let's do it.

- A. Your support of Alternative D has been included in the content analysis of all comments received.

#13 - Allen Mueller

Thank you very much. Good evening. I am Allen Mueller, Field Supervisor of the U.S. Fish and Wildlife Service office in Vicksburg, Mississippi. We've been working with the Forest Service and the Arkansas Department of Parks and Tourism and their consultants on the Mt. Magazine park proposal for several years. During our work, we have come to recognize that Mt. Magazine is a very special place. Not only because of its historical and economic place in the local communities and its striking vistas, but also because of its unique biological communities. Mt. Magazine is the home of over 45 rare species, mostly plants and invertebrates. Now, only one of these, the Mt. Magazine shagreen is only the federal endangered species list. Together, they form a unique ecosystem that is a product of Mt. Magazine's long isolation from other habitats. In recognition of the unique biological value of this ecosystem, the Fish and Wildlife Service has designated the North Rim, portions of the summit, the summit plateau, and Bear Hollow as Resource Category 1 Habitat. This designation was made using the Fish and Wildlife Service's mitigation policy. It means that we consider those areas as unique and irreplaceable on a national scale. This is not a regulatory designation. Its purpose is to advise potential developers of the unique value of this site, and to guide the Fish and Wildlife Service in recommendations that we make regarding any proposals in the area. Our planning goal for Resource Category 1 habitat is no loss of existing habitat value. This designation is not made lightly. It serves to demonstrate the high value placed on this site. In this case, the presence of there are Resource Category 1 habitat, if properly presented to the public through interpretive displays, could contribute in a positive way to the overall success of the park. The proposed park design, that is Alternative D, has been very carefully and skillfully developed to provide a park with the minimum adverse impacts to the mountain's unique living resources. However, to further minimize potential adverse impacts to sensitive habitat, we recommend that the new lodge be constructed at the old lodge site, and that the waste water be pumped down to the 1600 foot elevation. If the Bear Hollow lodge site is used without the piped discharge, the invertebrate community living in Bear Hollow, which is Resource Category 1 habitat, could be adversely impacted by the mountaintop discharge of wastewater. Because of the limited area on top of the mountain, any development can be expected to cause some adverse impacts. Accordingly, we recommend that the 19th century homestead, which does not appear to be essential to the park's success, be deleted or reduced to the smallest possible size. In closing, I would just like to say that we think the staff of the Forest Service and the Arkansas Department of Parks and Tourism and their consultants have done a great job with this proposal and with the environmental impact statement. If the operation of the park lives up to the quality of the park planning, then the citizens of Arkansas should have an excellent facility for many

years to come. Thank you for the opportunity to make this statement. (Mr. Mueller submitted a written statement which can be seen as # of the written responses).

- A. Mr. Mueller read a prepared statement from the Fish and Wildlife Service. Please refer to responses made to these comments in their written form.

#14 - Richard Gordon, Jr.

I'm Richard Gordon. I'm President of the Public Awareness Committee, which is a non-profit corporation. On my board is the Mayor of Ft. Smith, County Judge, people from the Chamber of Commerce, the Van Buren schools, the Greenwood schools, the Ft. Smith schools and other dignitaries including people from the Westark Community College. We're interested in tourism. We're interested in the environment. We're interested in recreation. One of the main things that we are interested in is that the park system, along with the U.S. Forest Service, set up some kind of Environmental Center. We need to train our teachers, we need to train our students, this has been alluded to, and we also need to train the applicants. And, I think we could set this up to where this is a tremendous opportunity for the entire state. I think this will also help you in your funding. Again, we have worked with all of you in the Forests. We've worked with all governmental agencies. And, we have found out in the past when we have reasonable people working together, you can come up with reasonable solutions, and we want to make sure that all of the users that are now enjoying Mt. Magazine will be able to continue to do so. We also want to make sure that the enforcement is there to keep from damaging the wildlife and the habitat. One of the problems we have, and I am sorry but we do not have to, but I would like to see someone from the Arkansas Game and Fish Commission. One of the problems the Arkansas Game and Fish Commission have is that they are underfunded, and they do not have the enforcement people that they need, and we have been pushing this for years. So again, we have got to make sure that we don't damage what we have got. And we need to set this up as an educational center. Again, we will work with you in every way we can possibly. Thank you, sir.

- A. Mr. Gordon provided written comments. Responses were made to his written comments.

#15 - Gerald Otmer

You'll have to excuse me. I just came from work and am a little late getting here. What I wanted to say is that I got a little mountain of my own. I overlook, right out my door there, I look at Mt. Magazine. It's very beautiful, and I came here 14 years ago a pretty sick man. I'm probably senior resource Captain in American today, yesterday, and the day before yesterday. When I came here we had beautiful animals. We got leopards, they say they got no panthers, but we have one up there that lives by me. We got an eagle. We got quite a few things. I've noticed that I've been away for a few years again, back at sea, I came home and I note that they came back. And, it seems to me that you can't hurt the environment unless you really destroy it from the roots up. And, if you're real careful, when you build something, you don't have a problem. And that's the way I'm building a new house on my place so that I don't hurt the environment. I don't hurt those little things they're talking about, them little snails.

We don't have them in the ocean, incidentally. We have bigger things. But, I, when I came up here I was hoping they would have a coffee shop up on top of that mountain and I hope they go back and build something up there. I believe it's the best thing could happen to this area. You can't hurt the environment if you just take it a little easy. That's all I wanted to say.

A. Your support of State Park development has been included in the content analysis of all comments received.

#16 - Representative Frank Willems

The shame that I have to go through sometimes, just to be recognized. (Laughter). Thanks for inviting me. Quite late, but anyway I appreciate it very much. Whatever it is I'm about to do I hope it's not what I'm thinking I could do. (Laughter). Anyhow I'm proud that we're here with Parks Department and the Forest Service and the rest of you. I'm deeply gratified by this meeting that we are having here. And also, I'm very happy that people are talking with each other and working together and looking forward, and trying to work things out. And, I hope. I can't ever see it possible that we can't have disagreement without being disagreeable. And I have been guilty of one time or so. Again, I apologize. My wife says I'm guilty of that quite often. I've asked her. (Laughter). Anyhow, I've heard a lot of the different phrases, sayings tonight. I noticed, gentlemen, that you have tuned in, you are looking at the possible problems that might exist, and I'm quite sure there are problems that could exist. But I've been here a little while, longer than some would hope for me to have been. But, I'm here yet. And I'm a little bit taken with the Mt. Magazine project. I think of the most beautiful thoughts I can think of aside from (laughter). I think that this is the most beautiful mountain and beautiful scenery, the most beautiful place in the whole wide world as far as I'm concerned. I am very serious about that. We are, I think, God has blessed us, blessed us beyond any measure that we can express because we have as Superintendent Scoggin said. I echo his opinions about this. We have the greatest people on earth here. I think the people in this country, this area, are very very wonderful people. They work hard, they bring a value of life that's not that unusual for this country or this state, but it is very unusual in that they all work together. If you can get a project started you watch them; they work together. And that's the beauty part of it, that's the most beautiful thing of all is the business of working together to accomplish the goals to work for the better of all people. I don't ever have much inclination to make one of those famous speeches. The most famous speeches are a very few words or less, so I shouldn't be doing that. I do have to express my thanks to all of you. Whether or not this comes about. But I also want to say there is one thing that I have not heard people too much about. And I appreciate very much that the hang gliders and the rockclimbers and the people that work with the geology are very interested. They should be, it's their profession. They love to do it. Others have good reason because they enjoy it. Any time you get me up in one of those hang-gliders both of us is going to be in trouble because you'll have to go with me. But we do need to work together to achieve the goal that we set out for us. And I think that goal is the accomplishment of a park on Mt. Magazine. We have worked so hard to get this far, and it's been a long time. I've been in office, I hate to tell you this, no I love to tell you this, I think you have made possible for me to be in this office this long; twenty years. Don't seem that long. Some of my neighbors say it seems a lot longer, but that's another story. But, it is to me, it's one of the finer things that we can do for ourselves, to work together and to show the

people that we don't want this to [unintelligible] the ecology and ecological movement, which I am 100% for. I'm an ex-farmer. No one is any more qualified, no one wants to see ecological balance in action more. Most of the good farmers, the dirt farmers are that way. There's some that aren't. But mostly they are. But, we don't want to see a city dump on Mt. Magazine. We want to see it beautiful and clean and redundant with beautiful flowers and grasses and things like that. Things that nature wants us to have. And you can see that I think beauty is in the eyes of the beholder. When I behold Mt. Magazine, it's beautiful when you look at the sky-line, when you look at the clouds, when you look at the people. When you see a hang-glider swooping around so beautiful like. That's precious. A bald-eagle is precious. By the way, my neighbor called and said there's an eagle hanging on our barbed-wire fence. My wife, the wonderful person she is, called the Game and Fish. And they sent a scout out to look for the bald-eagle that was hanging in the fence, which was not a bald-eagle, it was an owl. And he was tied up in that fence. You learn something about owls. That owl was very much alive. He almost ate that Game and Fish official. But, they got him loose and they took him to a safe place and they turned him loose. And that's the kind of people we have in this county. That's the kind of people we have in this area. That's the kind of people that would rescue a person or animal that wouldn't do no damage in order to save their lives and bring them back to nature. That's the kind of people I'm proud to be associated with. Thank you for listening. God bless all of you.

A. Thank you for your support and comments.

APPENDIX H:

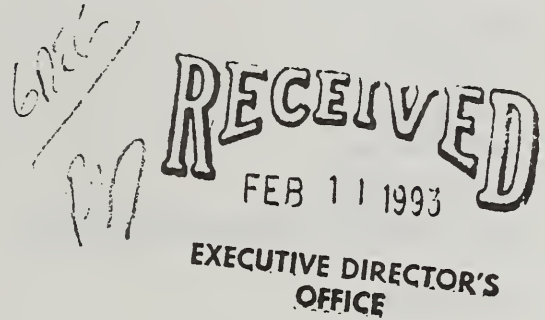
Letter of Concurrence from the Arkansas State Historic Preservation Officer



ARKANSAS
HISTORIC
PRESERVATION
PROGRAM

February 5, 1993

Mr. Lynn Neff
Forest Supervisor
Ozark-St. Francis National Forests
P.O. Box 1008
Russellville, AR 72801



RE: Logan County - General
Section 106 Review - USFS
Report Entitled "A Cultural Resources
Assessment and Archeological Survey of
Selected Areas of the Proposed State Park
on Mt. Magazine, Logan County, Arkansas"

Dear *Lynn* Mr. Neff:


My staff has reviewed the referenced report of investigation. It is thorough, comprehensive, and well written. We also concur with the archeologist's findings and recommendations, although archeological testing for National Register eligibility may not be necessary in some cases (e.g., the Ben Brown House, Springs & CCC/WPA Picnic Area (3L0429) and Sion House's Farm and Graves (3L0431)). Eligibility determinations on some properties may be made with existing data.

Regarding the Section 106 review process, we recommend that a Memorandum of Agreement (MOA) and a Treatment Plan for Historic Properties be negotiated among the Forest Service, the Advisory Council on Historic Preservation, and this office. The Arkansas Department of Parks and Tourism may serve as a consulting party. If human remains will be affected, the Forest Service should also follow the guidelines and procedures for implementing the Native American Grave Protection and Repatriation Act (NAGPRA), the Advisory Council's procedures set forth in Policy Interpretation Memorandum 89-1, and the guidelines developed for the Arkansas burial law (ACT 753).

Thank you for your interest and concern for the cultural heritage of Arkansas. We look forward to working with you on this project. If you have any questions, please contact George McCluskey of my staff at (501) 324-9880.



Sincerely,

A handwritten signature in cursive script, appearing to read "Cathy".

Cathy Buford
State Historic Preservation Officer

CB:GM:lh

cc: Advisory Council on Historic Preservation
Arkansas Department of Parks and Tourism
SPEARS, Inc.
State Archeologist

NATIONAL AGRICULTURAL LIBRARY



1022352439

* NATIONAL AGRICULTURAL LIBRARY



1022352439

